



Key Performance Indicator			
Line Counting			
Lines of Code	481219	↗	✓
Source Lines Of Code	401326	↗	✓
Effective Lines Of Code	325196	↗	✓
Cyclomatic Complexity	12265	↗	✓
Comment Rate	16 %	↘	✗
Decision Making			
Business Value	1912	→	I
Technical Debt	3626	↗	I
Maturity Index	65 %	↘	C
Stability Index	84 %	↗	B
Reusability Index	44 %	↘	D

Squore 18.0.18

Installation and Administration Guide

Reference : SIM_Squore
Version : 18.0.18
Date : 27/09/2019

Installation and Administration Guide

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Abstract

This edition of the Installation and Administration Guide applies to Squore 18.0.18 and to all subsequent releases and modifications until otherwise indicated in new editions.

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Typographical Conventions

The following conventions are used in this manual.

Typeface or Symbol	Meaning
Bold	Book titles, important items, or items that can be selected including buttons and menu choices. For example: Click the Next button to continue
<i>Italic</i>	A name of a user defined textual element. For example: Username : <i>admin</i>
Courier New	Files and directories; file extensions, computer output. For example: Edit the <code>config.xml</code> file
Courier Bold	Commands, screen messages requiring user action. For example: Username : <i>admin</i>
>	Menu choices. For example: Select File > Open . This means select the File menu, then select the Open command from it.
<...>	Generic terms. For example: <SQUORE_HOME> refers to the Squore installation directory.

Notes

Screenshots displayed in this manual may differ slightly from the ones in the actual product.

Acronyms and Abbreviations

The following acronyms and abbreviations are used in this manual.

CI	Continuous Integration
CLI	Command Line Interface
DP	Data Provider, a Squore module capable of handling input from various other systems and import information into Squore
RC	Repository Connector, a Squore module capable of extracting source code from source code management systems.

1. Introduction

1.1. Foreword

This document was released by Squoring Technologies.

It is part of the user documentation of the Squore software product edited and distributed by Squoring Technologies.

1.2. About This Document

This document is the Installation Guide for the Squore software product.

While we recommend that you read it in its entirety, we divided it up into chapters for an easier introduction to Squore:

- Jump to Chapter 2, *The Squore Architecture* to learn about the available Squore components.
- Jump to Chapter 3, *Installing Squore Server* to learn how to deploy Squore in your environment.
- Jump to Chapter 4, *Starting and Stopping Squore* to learn how to start Squore Server.
- Jump to Chapter 5, *Squore Administration* to discover how to maintain a Squore installation.
- Jump to Chapter 6, *Integrating Squore on Your Network* to understand how to integrate Squore Server within your network.
- Jump to Chapter 7, *Sizing Squore Server and Database* to evaluate the resources that Squore will require in your environment.

If you want to install Squore Command Line Interface, refer to the Command Line Interface manual.

If you are already familiar with Squore, you can navigate this manual by looking for what has changed since the previous version. New functionality is tagged with **(new in 18.0)** throughout this manual. A summary of the new features described in this manual is available in the entry ***** What's New in Squore 18.0?** of this manual's Index.

1.3. Contacting Squoring Technologies Product Support

If the information provided in this manual is erroneous or inaccurate, or if you encounter problems during your installation, contact Squoring Technologies Product Support: <https://support.squoring.com/>

You will need a valid Squore customer account to submit a support request. You can create an account on the support website if you do not have one already.

For any communication:

✉ support@squoring.com

📄 **Squoring Technologies Product Support**
76, allées Jean Jaurès / 31000 Toulouse - FRANCE

1.4. Responsibilities

Approval of this version of the document and any further updates are the responsibility of Squoring Technologies.

1.5. Getting the Latest Version of this Manual

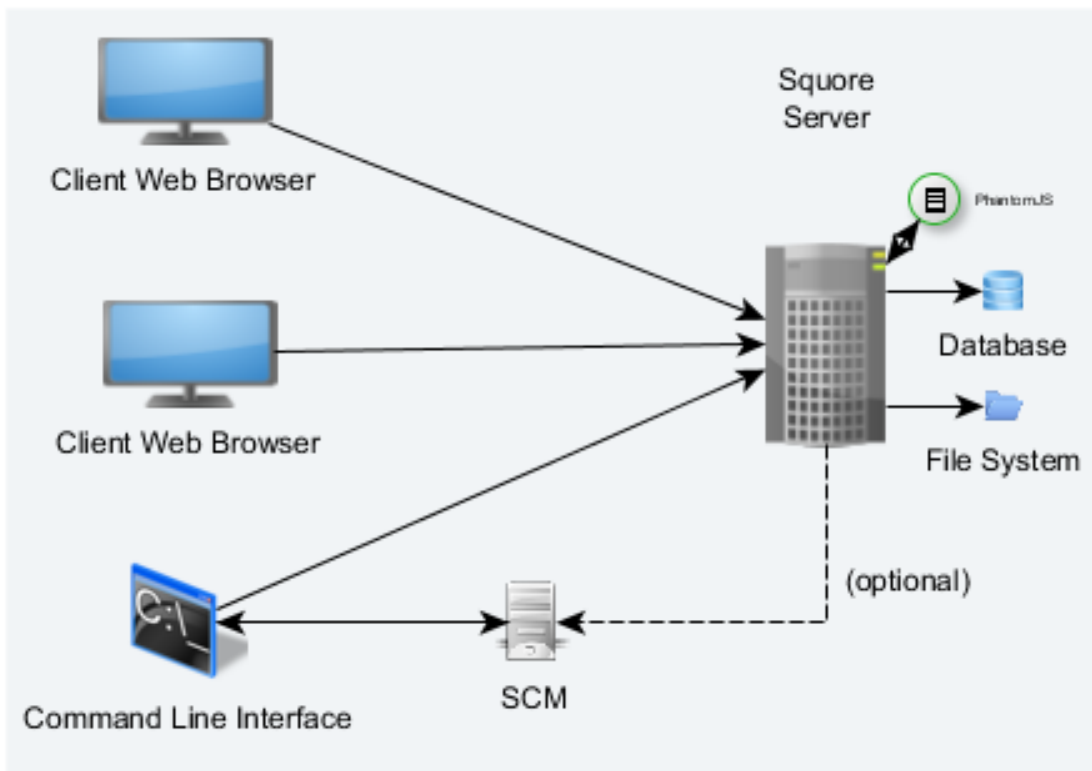
The version of this manual included in your Squore installation may have been updated. If you would like to check for updated user guides, consult the Squoring Technologies documentation site to consult or download the latest Squore manuals at <https://support.squoring.com/documentation/18.0.18>. Manuals are constantly updated and published as soon as they are available.

2. The Squore Architecture

2.1. The Squore Ecosystem

Squore is based on a traditional 3-tier architecture consisting of:

- A database and a data folder for storing project data
- An application server running the main application, the licence server and a distribution of PhantomJS
- Clients that can interact with the server: a front-end accessible through a Web Browser and a Command Line Interface (Squore CLI) to interact with the server from a console



The Squore Architecture

As shown in the schema above, Squore Server can provide analysis results to clients without having access to any source code, in scenarios where the analysis is carried out on a client machine with access to the SCM repository, as is the case in most Continuous Integration environments.

If you are planning to access source code hosted in Subversion, Git, ClearCase, CVS, Integrity, Perforce, TFS or Synergy repositories, a command line client for this repository must be available on the machine where the Squore analysis carried out. For complete information about all installation pre-requisites, consult Section 3.1, "Installation Prerequisites".

Squore allows analysing source code in the following programming languages: ABAP, Ada, C, C++, MindC, C#, COBOL, Java, JavaScript, Fortran 77, Fortran 90, Objective-C, PHP, PL/SQL, Python, T-SQL, Visual Basic .NET, XAML, Lustre.

2.2. The Squore Database and Data Folder

The Squore database is a **PostgreSQL** or **Oracle** database used for storing:

- A hierarchy of artefacts defined in a software projects (e.g. files, classes, functions)
- Incremental sets of measures provided by the source code parsers and other data providers, or computed according to an analysis model

Along with the database, a set of data files is maintained on disk to compute information about a project's history and stability. A backup of a Squore installation must always include the database and the projects folder. For more information about backing up your installation, refer to Section 5.3.1, “Backing-Up the Squore Data”.

Note

No source code is stored in the database or the projects folder. Source code checked out from SCMs is located in a temporary folder and can be cleaned up at the end of an analysis.

2.3. The Squore Application Server

The Squore application server is based on the **WildFly** framework. Its main functionalities are:

- Aggregating data coming from the various Squore Data Providers
- Applying an analysis model, producing high-level key performance indicators
- Exploring and analysing the results using efficient graphical representations and statistical features

2.4. The Squore Web Interface

Squore end-users access the server services through a Web interface that enables them to:

- Create projects from source code or other data types via the Squore Data Providers system.
- Explore the results of analyses, view the levels of performance of the project artefacts via a user-specific, dynamic dashboard making use of filtering and sorting features
- Review action plans, highlights and findings of the analysis
- Export information for reporting purposes
- Perform administration tasks like managing users and groups or troubleshooting the system

Refer to Section 3.1.3, “Browser Compatibility” to make sure that your the Squore Wib Interface is compatible with your browser

For more details on performance-related requirements when using Squore, please refer to Chapter 7, *Sizing Squore Server and Database*.

2.5. Squore CLI

In order to provide compatibility with Continuous Integration systems or run analyses on machines other than Squore Server, Squoring Technologies also delivers Squore CLI (Command Line Interface): a set of APIs used to remotely create and manage software projects.

Squore CLI is a Squore package that allows a Squore client to locally analyse project source code files visible to the client machine and send the results to a remote Squore server.

Squore CLI comes as a separate installable package that can be downloaded from Squoring Technologies's support site: https://support.squoring.com/download_area.php.

For more information about installing Squore CLI, refer to the Command Line Interface manual.

2.6. The Squore Licence Server

Squore Server requires a valid licence file in order to run. The licence file information is served by the Squore Licence Server, which reads a licence file `squore-license.p7s` located in `<SQUORE_HOME>/server/standalone/configuration`.

The licence file is delivered by Squoring Technologies and can be copied on the machine hosting Squore Licence Server at installation time or post-installation. In all cases, Squore Server must be restarted to take into account new licence information.

If you run multiple instances of Squore Server, each one can have its own Squore Licence Server and licence file, or you can point them to a common Squore Licence Server.

Note

Sharing an instance of Squore Licence Server between multiple Squore Server instances means that each Squore Server instance queries the Squore Licence Server to find out which licence features are available. The Squore Licence Server keeps track of the total number of active users, volume of code analysed and number of projects created on all instances of Squore Server. User-Management is specific to each Squore Server: if a user called "admin" exists on two instances of Squore Server linked to the same Squore Licence Server and both accounts are active, as far as the Squore Licence Server is concerned, two licences are used by two individual users.

The licence file restricts Squore usage according to the following parameters:

- A licence file has a start date: it becomes active at a date decided by Squoring Technologies when the licence is issued.
- A licence file has an end date: it becomes invalid at a date decided by Squoring Technologies when the licence is issued.
- A licence file is tied to a particular server host-id, a fingerprint of some of the hardware components of a server machine. It can therefore not be used on another machine. If you need to move your licence file to another machine, contact Squoring Technologies to request a new licence. If you need to know your host-id, refer to Section 3.1.6, "Obtaining a Licence File".
- A licence file defines a maximum number of active users. A user is active if any activity has been recorded for their Squore Server account in the past 6 months. Activities include remote project creation, viewing of analysis results, and e-mail notification.
- A Squore login is meant to be used by an individual user: each Squore user should log into Squore using their own personal account.
- A licence file defines a maximum number of projects that can be created. After this number is reached, no new projects can be created. Existing projects can continue to be analysed.
- A licence file defines a maximum number of lines of source code that can be analysed. After this number is reached, no new analysis can be carried out.
- A licence file defines the ability to generate XML report of analyses, export data in CSV format and generate PDF reports from the web interface.

3. Installing Squore Server

Warning

Squore Server can only be installed in a folder whose path contains no space, accented and non-Latin letters or special characters. This is a PostgreSQL limitation that must be followed to ensure maximum compatibility, efficiency, and to avoid unexpected behaviour when analysing projects.

The application files (product binaries and standard configuration) and the data files (database cluster, analysis data, custom configuration, custom scripts...) must be located in **separate folders**.

By default, application files are deployed in a folder we will refer to in this manual as **<SQUORE_HOME>** and data files are deployed under a folder we will refer to as **<SQUORE_DATA>**.

Refer to the specific options of the setup package for your platform below to know how to specify the desired paths when installing Squore Server.

3.1. Installation Prerequisites

3.1.1. Supported Operating Systems

The following is a list of the officially supported and tested operating systems:

- CentOS 6
- CentOS 7
- Fedora 19
- Ubuntu Server 16.04
- Windows 8
- Windows 10
- Windows Server 2012 R2

Note

A 64-bit version of the OS is required

The following is a list of the operating systems that are not regularly tested but are known to be working:

- RedHat EL 6
- RedHat EL 7
- SuSe Linux 11.1
- Ubuntu Server 10.04
- Ubuntu Server 14.04
- Windows 7
- Windows Server 2008 R2

3.1.2. Supported Database Management Systems

Squore Server can use the following database management systems to store its data:

- PostgreSQL 8.4 minimum (PostgreSQL 9.6 is recommended) and up
- Oracle Database 12c Enterprise Edition Release 12.1.0.2.0 - 64bit Production

In both cases, it is possible to have database on the same machine as Squore Server or on a remote machine.

Note

When using a database backend on a remote machine, the database administrator is responsible for backing up the database. The backup scripts included in the Squore Server installation will only handle the backup of the data stored on the Squore Server file system in that case. You can find more information about backup strategies for Squore Server in the section called **Backup Tools** in the Installation and Administration Guide.

3.1.3. Browser Compatibility

Squore is compatible with many browsers. The following is the list of officially supported browsers:

- **Google Chrome stable branch** [<https://www.chromium.org/getting-involved/dev-channel>]
- **Mozilla Firefox 59 and up** [<https://www.mozilla.org/en-US/firefox/59.0/releasenotes/>]
- **Microsoft Internet Explorer 11.0 (Update Versions 11.0.19 and up)**
- **Microsoft Edge 40.15063.0.0 and up**

3.1.4. For All Systems

For a successful installation of Squore, you will need:

- The latest version of the Squore Server installer, which can be downloaded from https://support.squoring.com/download_area.php
- A supported Operating System, as stated in Section 3.1.1, “Supported Operating Systems”
- A user account with system administrator privileges
- The Oracle Java Runtime Environment version 8 (other versions are not supported)

Warning

- Using the 64-bit version is recommended. It is technically possible to run Squore on a server using a 32-bit JRE, however this will limit the memory available to 1GB of RAM to run the application, which will result in poor performance. If you still want to attempt such an installation, consult the troubleshooting page at http://openwiki.squoring.com/index.php/Running_Squore_On_A_32-bit_Java_Installation
- At least 4 GB of space available on the disk for a full installation with demo projects
- At least 8 GB of RAM on the server machine
- A valid Squore Server licence file (optional, since the licence file can be added after installation)

Tip

Keep in mind that the requirements above are the strict minimum. In production, Squore Server generally runs on a dedicated machine with a multi-core processor and a minimum of 16GB of RAM. Squore reserves 25% of the available RAM of the machine to the database and another 25% to the server. External processes (like Checkstyle or FindBugs) running on the same machine as Squore may add to the amount of RAM required for analysing source code. Linux is known to offer better performances than Windows when running Squore. For a production database, you should plan a minimum of 20 GB of disk space. For more details about resource usage in Squore, consult Chapter 7, *Sizing Squore Server and Database*.

3.1.5. Prerequisites for Oracle

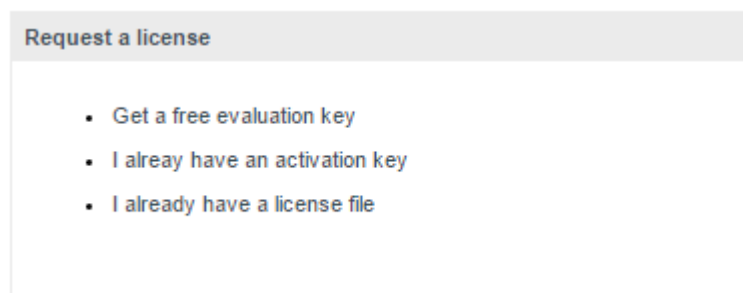
When using Oracle as a database backend, a database administrator must create an Oracle user before you can install Squore.

The user requires the following privileges:

- **CREATE PROCEDURE**
- **CREATE SEQUENCE**
- **CREATE SESSION**
- **CREATE TABLE**
- **CREATE TYPE**
- **CREATE VIEW**
- A valid quota for the tablespace used by the user (for example **UNLIMITED**)

3.1.6. Obtaining a Licence File

A Squore licence file is linked to the hardware that Squore Server is installed on. When you complete your installation of Squore Server, and access http://localhost:8180/SQuORE_Server in your browser, you are presented with a screen that allows you to request an activation key and download an evaluation licence.



The licence request dialog

Request an activation key or enter an existing one to download a temporary licence for your machine. Requesting an activation key ensures that Squoring Technologies gets all the information necessary to generate your final licence file when the evaluation period ends.

Note

The licence request dialog only displays when accessing http://localhost:8180/SQuORE_Server (it redirects to http://localhost:8180/SQuORE_Server/License/License.xhtml) from the machine where Squore Server is installed. If you cannot open a browser window on the server, you will have to request your evaluation licence by manually generating and e-mailing your host-id to Squoring Technologies:

1. Open a terminal on the machine where you installed or plan to install Squore.
2. Change to the <SQUORE_HOME> folder
3. Run the command `java -jar ./lib/hostid.jar`.
4. Send the output to support@squoring.com.

3.1.7. Packages for Windows

A JRE is required for Squore Server. The Windows installer contains the tcl and perl runtimes as well as a portable PostgreSQL installation and a distribution of PhantomJS.

3.1.8. Packages for Linux

On Linux platforms, the following must be installed before installing Squore:

- **Perl** version 5.10.1 or greater including the following extra-modules:

- Mandatory packages:
 - **Date::Calc** [module details] [<http://search.cpan.org/~stbey/Date-Calc/lib/Date/Calc.pod>]
 - **DBD::Pg** (if you are using PostgreSQL and use export scripts for HIS metrics) [module details] [<http://search.cpan.org/~turnstep/DBD-Pg/Pg.pm>]
 - **DBI** (if you are using PostgreSQL and use export scripts for HIS metrics) [module details] [<http://search.cpan.org/~timb/DBI/DBI.pm>]
 - **Digest::SHA** [module details] [<http://search.cpan.org/~mshelor/Digest-SHA/lib/Digest/SHA.pm>]
 - **HTTP::Request** [module details] [<http://search.cpan.org/~gaas/HTTP-Message/lib/HTTP/Request.pm>]
 - **JSON** [module details] [<http://search.cpan.org/~makamaka/JSON/lib/JSON.pm>]
 - **LWP** [module details] [<http://search.cpan.org/~ether/libwww-perl/lib/LWP.pm>]
 - **LWP::UserAgent** [module details] [<http://search.cpan.org/~gaas/libwww-perl/lib/LWP/UserAgent.pm>]
 - **Time::HiRes** [module details] [<http://search.cpan.org/~zefram/Time-HiRes/HiRes.pm>]
 - **XML::Parser** [module details] [<http://search.cpan.org/~toddr/XML-Parser/Parser.pm>]
- Optional packages for working with RTRT (new in 18.0):
 - **XML::Simple** [module details] [<http://search.cpan.org/~grantm/XML-Simple/lib/XML/Simple.pm>]
- Optional packages for working with Microsoft Excel:
 - **HTML::Entities** [module details] [<http://search.cpan.org/dist/HTML-Parser/lib/HTML/Entities.pm>]
 - **Spreadsheet::BasicRead** [module details] [<http://search.cpan.org/~gng/Spreadsheet-BasicRead/BasicRead.pm>]
- Optional packages for working with OSLC systems:
 - **Date::Parse** [module details] [<http://search.cpan.org/~gbarr/TimeDate/lib/Date/Parse.pm>]
 - **WWW::Mechanize** [module details] [<http://search.cpan.org/~ether/WWW-Mechanize/lib/WWW/Mechanize.pm>]
 - **XML::LibXML** [module details] [<http://search.cpan.org/~shlomif/XML-LibXML/LibXML.pod>]
- Optional packages for Advanced CSV Export Management:
 - **Text::CSV** [module details] [<http://search.cpan.org/~makamaka/Text-CSV/lib/Text/CSV.pm>]
- Optional packages for working with Mantis, Jira and other ticket management software:
 - **Date::Parse** [module details] [<http://search.cpan.org/~gbarr/TimeDate/lib/Date/Parse.pm>]
 - **JSON::XS** [module details] [<http://search.cpan.org/~mlehmman/JSON-XS/XS.pm>]
 - **Spreadsheet::ParseExcel** [module details] [<http://search.cpan.org/~dougw/Spreadsheet-ParseExcel/lib/Spreadsheet/ParseExcel.pm>]
 - **Spreadsheet::BasicRead** [module details] [<http://search.cpan.org/~gng/Spreadsheet-BasicRead/BasicRead.pm>]
 - **Text::CSV** [module details] [<http://search.cpan.org/~makamaka/Text-CSV/lib/Text/CSV.pm>]
 - **WWW::Mechanize** [module details] [<http://search.cpan.org/~ether/WWW-Mechanize/lib/WWW/Mechanize.pm>]
 - **XML::LibXML** [module details] [<http://search.cpan.org/~shlomif/XML-LibXML/LibXML.pod>]

Tip

If some of these modules are not available as packages on your operating system, use your perl installation's `cpan` to install the modules. Using the OS packages is recommended, as it avoids having to reinstall via `cpan` after upgrading your version of perl.

- **Tcl** version 8.5 or greater,
- **PostgreSQL** version 8.4 minimum (PostgreSQL 9.6 is recommended) (unless you use a RDBMS running on another system) including at least the **server** component, and optionally, the **pgAdmin** utility. Note that your system must use a UTF-8 locale for the database creation to be carried out successfully. You can force this by running `export LANG=en_US.UTF-8` or `export LANG=fr_FR.UTF-8` according to what is available on your system before installing Squore.
- The **rsync** utility

If you are running on a headless Squore Server, `java-1.6.0-openjdk` may not be sufficient, as it lacks some fonts to render graphics. This is why using Oracle's JRE is recommended.

3.1.9. Packages for CentOS and Red Hat Enterprise Linux

On Red Hat Enterprise Linux and CentOS (6.5 and 7.1), the dependencies are satisfied by the following packages:

Mandatory packages:

- **java-1.8.0-openjdk**
- **perl**
- **perl-Date-Calc**
- **perl-Digest-SHA**
- **perl-JSON**
- **perl-libwww-perl**
- **perl-Time-HiRes**
- **perl-XML-Parser**
- **postgresql-server** (unless you use a RDBMS running on another system)
- **rsync**
- **tcl**

Optional packages for working with RTRT (new in 18.0):

- **perl-XML-Simple**

Optional packages for working with Microsoft Excel:

- **perl-HTML-Parser**
- **perl-CPAN** (CPAN utility requirement)
- **perl-Spreadsheet-ParseExcel** (available in the EPEL repository)
- **perl-Spreadsheet-XLSX** (available in the EPEL repository)

Warning

The module **Spreadsheet::BasicRead** is not available as a package and must therefore be installed using `cpan` (make sure `cpan` is properly configured, by running `cpan` without arguments first):

```
sudo cpan -i Spreadsheet::BasicRead
```

Optional packages for working with OSLC systems:

- **perl-TimeDate**
- **perl-WWW-Mechanize** (available in the EPEL repository)
- **perl-XML-LibXML**

Optional packages for Advanced CSV Export Management:

- **perl-Text-CSV**

Optional packages for working with Mantis, Jira and other ticket management software:

- **perl-TimeDate**
- **perl-JSON-XS**
- **perl-Spreadsheet-ParseExcel** (available in the EPEL repository)
- **perl-Text-CSV**
- **perl-WWW-Mechanize** (available in the EPEL repository)
- **perl-XML-LibXML**

Warning

The module **Spreadsheet::BasicRead** is not available as a package and must therefore be installed using **cpan** (make sure **cpan** is properly configured, by running **cpan** without arguments first):

```
sudo cpan -i Spreadsheet::BasicRead
```

For more information about how to install the Extra Packages for Enterprise Linux (EPEL) repository, consult <https://fedoraproject.org/wiki/EPEL>.

3.1.10. Packages for Ubuntu

On Ubuntu 16.04.3 LTS, the dependencies are satisfied by the following packages:

Mandatory packages:

- **libdate-calc-perl**
- **libdbd-pg-perl** (if you are using PostgreSQL and use export scripts for HIS metrics)
- **libdbi-perl** (if you are using PostgreSQL and use export scripts for HIS metrics)
- **libhttp-message-perl**
- **libjson-perl**
- **libwww-perl**
- **libxml-parser-perl**
- **openjdk-8-jre**
- **perl**
- **postgresql** (unless you use a RDBMS running on another system)
- **rsync**

→ **tcl**

Optional packages for working with RTTR (new in 18.0):

→ **libxml-simple-perl**

Optional packages for working with Microsoft Excel:

→ **make** (CPAN utility requirement)

→ **libhtml-parser-perl**

→ **libspreadsheet-parseexcel-perl**

→ **libspreadsheet-xlsx-perl**

Warning

The module **Spreadsheet::BasicRead** is not available as a package and must therefore be installed using **cpan** (make sure **cpan** is properly configured, by running **cpan** without arguments first):

```
sudo cpan -i Spreadsheet::BasicRead
```

Optional packages for working with OSLC systems:

→ **libtimedate-perl**

→ **libwww-mechanize-perl**

→ **libxml-libxml-perl**

Optional packages for Advanced CSV Export Management:

→ **libtext-csv-perl**

Optional packages for working with Mantis, Jira and other ticket management software:

→ **libtimedate-perl**

→ **libjson-perl**

→ **libspreadsheet-parseexcel-perl** (available in the EPEL repository)

→ **libtext-csv-perl**

→ **libwww-mechanize-perl** (available in the EPEL repository)

→ **libxml-libxml-perl**

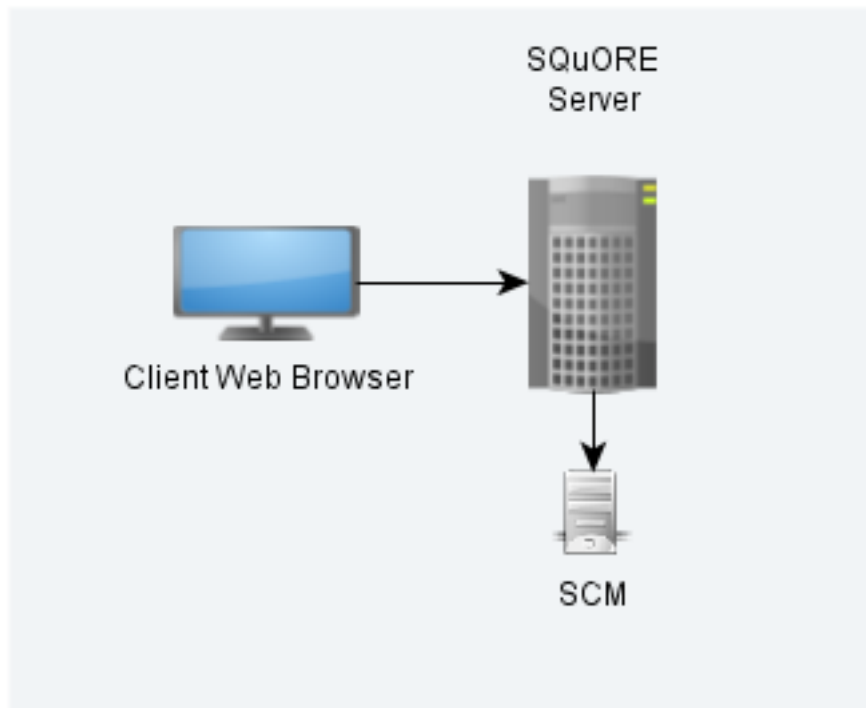
Warning

The module **Spreadsheet::BasicRead** is not available as a package and must therefore be installed using **cpan** (make sure **cpan** is properly configured, by running **cpan** without arguments first):

```
sudo cpan -i Spreadsheet::BasicRead
```

3.2. Common Deployment Scenarios

3.2.1. Creating Projects using the Web Interface Only

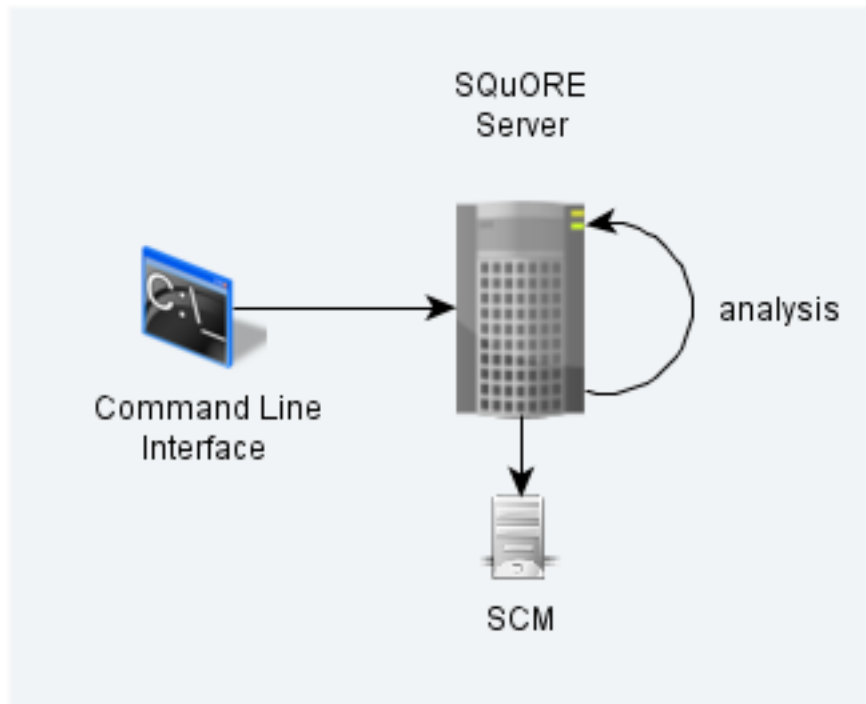


Squore in a configuration where projects are created via the web interface

In this simple deployment, you only use the web UI to create projects. Squore Server is installed on a machine and you connect to it using a web browser. Analyses are carried out on the server, which must have access to the source files you are telling it to analyse.

3.2.2. Creating Projects From a Client Machine

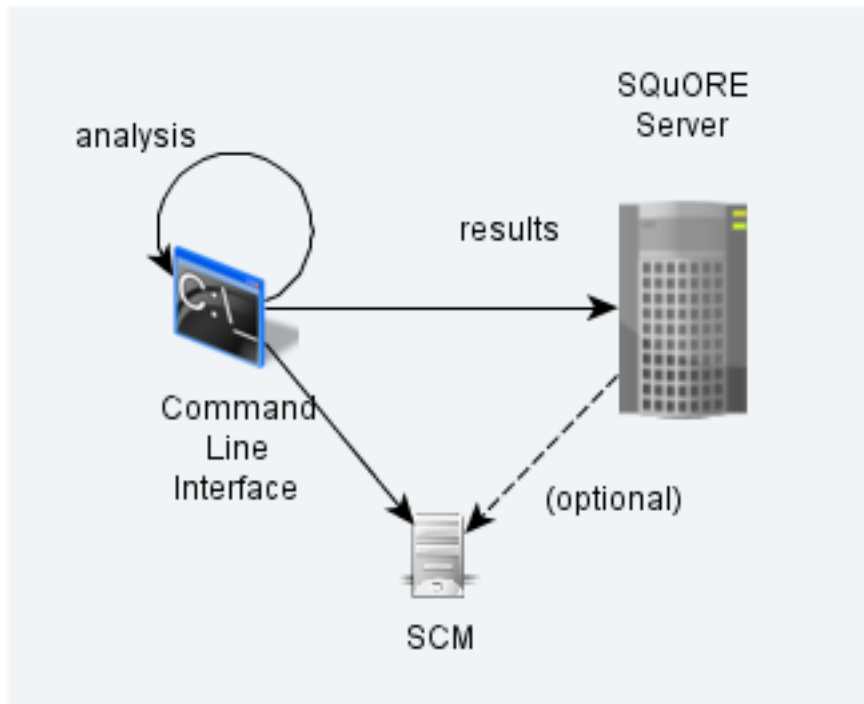
Instructing the Server to Run an Analysis



Squore in a configuration where projects creations are requested by a client and delegated to a server

In this deployment, Squore Server is installed on one machine (the server), and Squore CLI is installed on another machine (the client). The client remote-controls the server and instructs it to analyse source files. The client provides the path to the sources as the server sees it. The sources need to be visible or accessible from the server only, and the code is fully analysed on the server. This is known as the **Delegate method** and is quite similar to what you achieve by creating projects from the web interface directly.

Sending Local Analysis Results to the Server



Squore in a configuration where projects creations are run locally on a client and results are sent to a server

In this type of deployment the setup is the same as in the previous method, but the client runs the full analysis and only send the results of the analysis to the server when it is done. This is useful when the server does not have access to the source code, or when parts of the data analysed is only available on the client machine.

3.2.3. Using a Remote Database

It is possible to install Squore Server and use a database running on another machine. In this mode, Squore Server does not manage the database startup and shutdown, and database backups should be performed manually.

If you plan on performing such an installation, ensure that you have access to the information:

- The IP address or hostname of the server where the database is running
- The port that the database is listening on
- The name of the PostgreSQL database or the Oracle schema that will store your data
- The credentials required to connect to the database backend

The installer requires that the specified user and database already exist so it can connect and initialise the database using the details provided. However, the Linux installation script also include an extra option to specify SYSDBA credentials to automatically create a new Oracle schema for Squore.

Warning

When performing backups, ensure that you backup the database and the project folder at the same time so that you can restore a coherent snapshot of your data. For more information about backups in Squore, consult Section 5.3, “Backup Tools”.

3.2.4. Using Squore in Continuous Integration

In a Continuous Integration scenario, you are free to choose either client/server deployment method described in Section 3.2.2, "Creating Projects From a Client Machine". This will depend on which machine carried out the source code extraction or computes the data you feed to the Data Providers. You can learn more about how to configure Squore in a Continuous Integration environment by referring to the Command Line Interface Manual.

3.2.5. Access from Mobile Devices

Squore provides a mobile-friendly web interface that can be used by users to view their favourite charts in their dashboards. This requires no extra configuration on your part, as it uses the same http port as the main web interface. For more information about how users may use Squore Mobile, refer to the Getting Started Guide.

3.3. Installing Squore Server on Windows

This section describes the possible scenarios for installing Squore on windows.

If you use all the default settings, the installer will deploy the following components in the specified locations:

- `<SQUORE_HOME>` is `%SYSTEMDRIVE%\Squoring\squore-server` and contains Squore Server and its dependencies, including dedicated distributions of:
 - Strawberry Perl 5.12.3.0 Portable
 - PostgreSQL 9.6.7 Portable
 - Tcl 8.5 for Windows 8.5.12
 - PhantomJS 2.1.1
 - WildFly 10.1.0
- `<SQUORE_DATA>` is `%SYSTEMDRIVE%\Squoring\squore-data` and consists of the following subfolders:
 - The Squore database in `<SQUORE_DATA>\cluster`
 - The Squore database backup directory in `<SQUORE_DATA>\backup`
 - The Squore project data directory in `<SQUORE_DATA>\projects`
 - The Squore temporary data directory in `<SQUORE_DATA>\temp`
 - The Squore temporary source code directory in `<SQUORE_DATA>\temp\sources`
 - The Squore workspace directory in `<SQUORE_DATA>\workspace`

The installer provides options to:

- use a different installation folder
- use a specific path for temporary data and project data
- use a specific path for the local PostgreSQL cluster and backup folder
- use an existing local PostgreSQL instance
- use a remote PostgreSQL or Oracle database
- use your own perl distribution

Warning

The data and temporary folders must be excluded from the scope of virus scanners, malware protectors and search indexers to avoid any errors during an analysis.

In order to start installing Squore, log on with an account that has administrator privileges and launch the Squore installer (squire-18.0.18-windows-x86_64.msi). Each of the wizard screens is documented below in the order that you will see them.

Tip

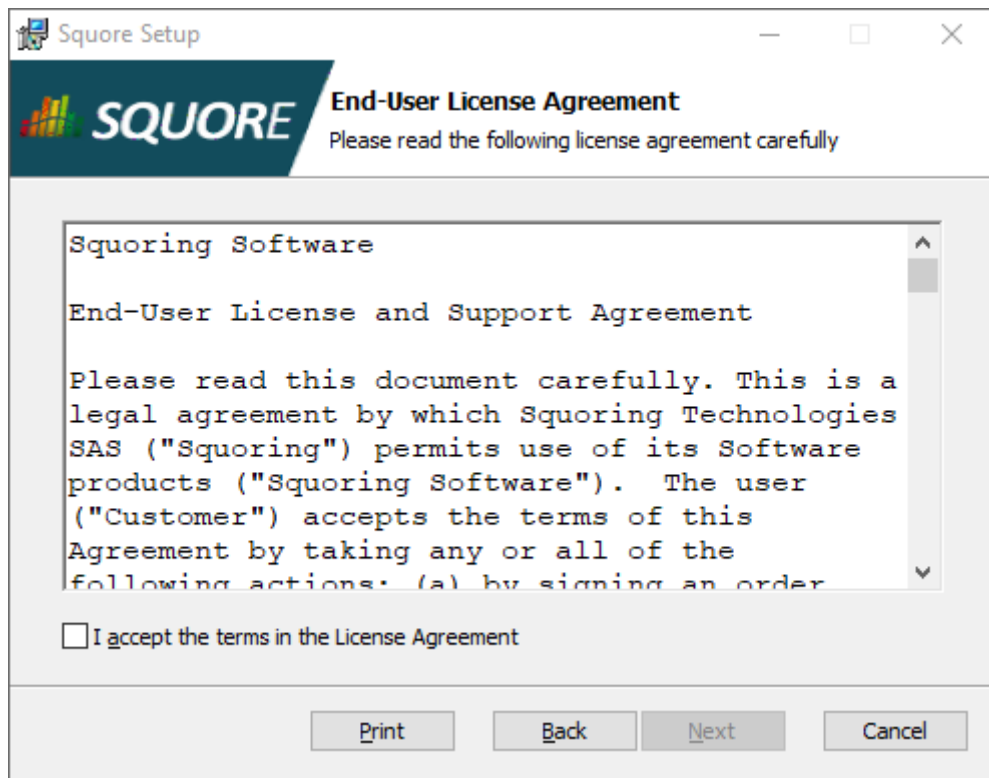
Running the Windows installer generates a log file in <SQUORE_HOME>\install.log, which you can consult if you think there is an issue with your installation. When an installation or upgrade fails, the operation is rolled back in an attempt to remove all files in the selected installation folder. When this happens, the log file can be found in %LOCALAPPDATA%\Temp\install.log instead.

1. The Squore installer Welcome screen

The Squore installer Welcome screen

On the Welcome screen, click the **Next** button to start the installation.

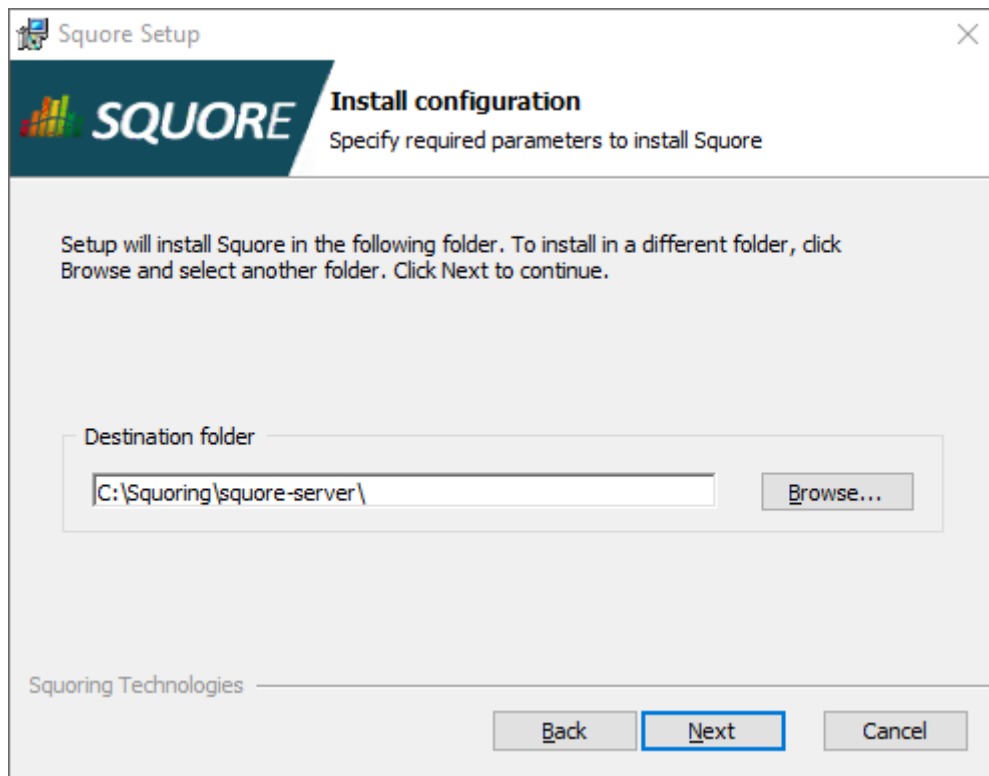
2. The Squore Licence Agreement screen



The Squore Licence Agreement screen

Review and accept the Licence Agreement, then click the **Next** button to continue with the installation.

3. Squore Server Destination Folder screen



Squore Server Destination Folder screen

The Destination Folder screen allows you to select the Squore installation folder, where the application server will be installed. If you choose the path of an existing Squore installation, the installer will offer to upgrade this existing installation. **Note that you should back up your data before you attempt to upgrade a Squore installation.**

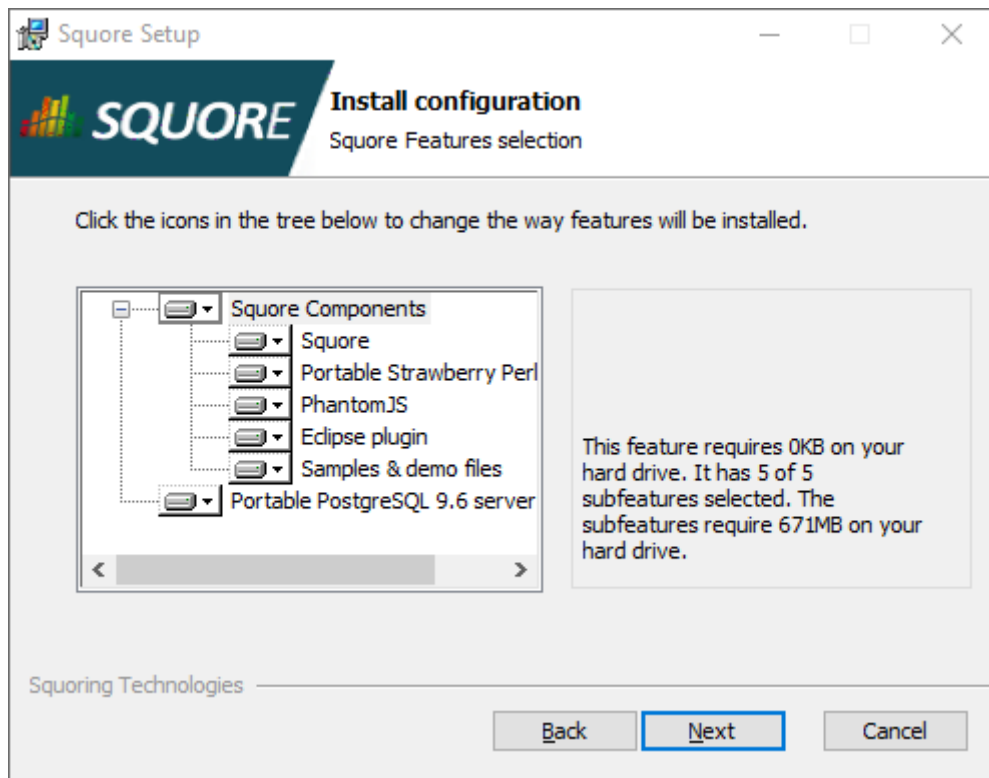
Tip

The steps to follow in order to upgrade an existing installation are described in Section 3.6, “Upgrading from a Previous Version”. The rest of the current chapter describes the procedure for a new installation.

Check that the location suggested by the Squore installer is appropriate. If not, use the **Browse...** button to select another location.

After specifying the Destination Folder, click on the **Next** button.

4. The Feature Selection screen

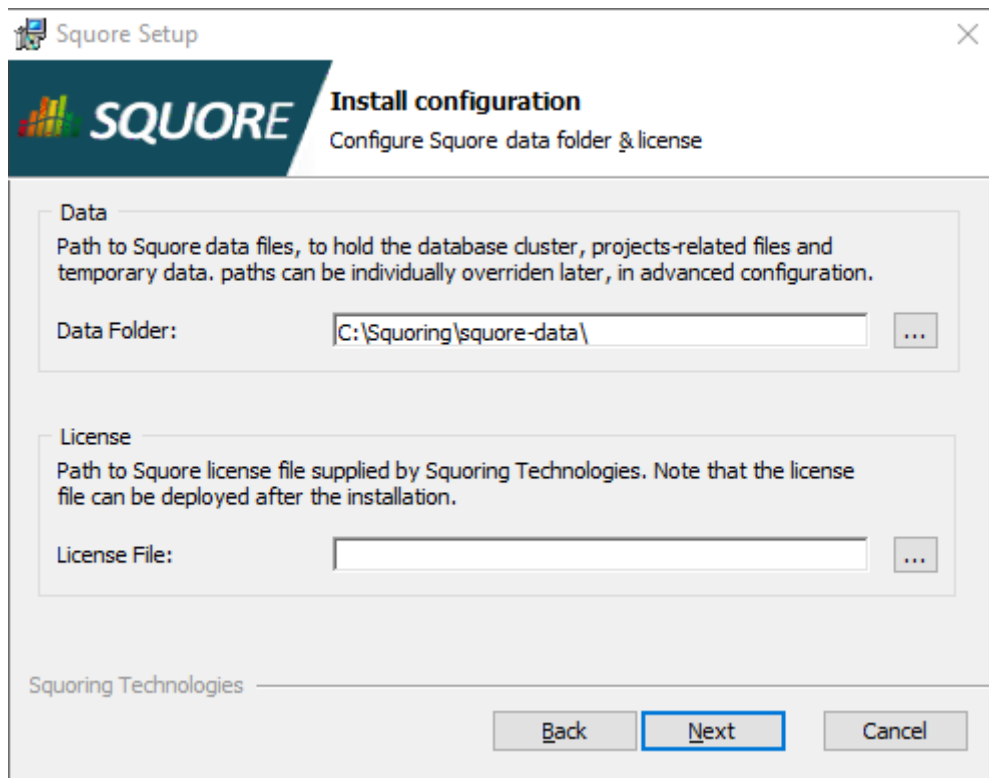


The Feature Selection screen

The Components screen allows you to choose the components of Squore that will be installed.

If you are unsure which components are needed on your system, you can safely leave all of them selected and then, click the **Next** button.

5. The General Options screen



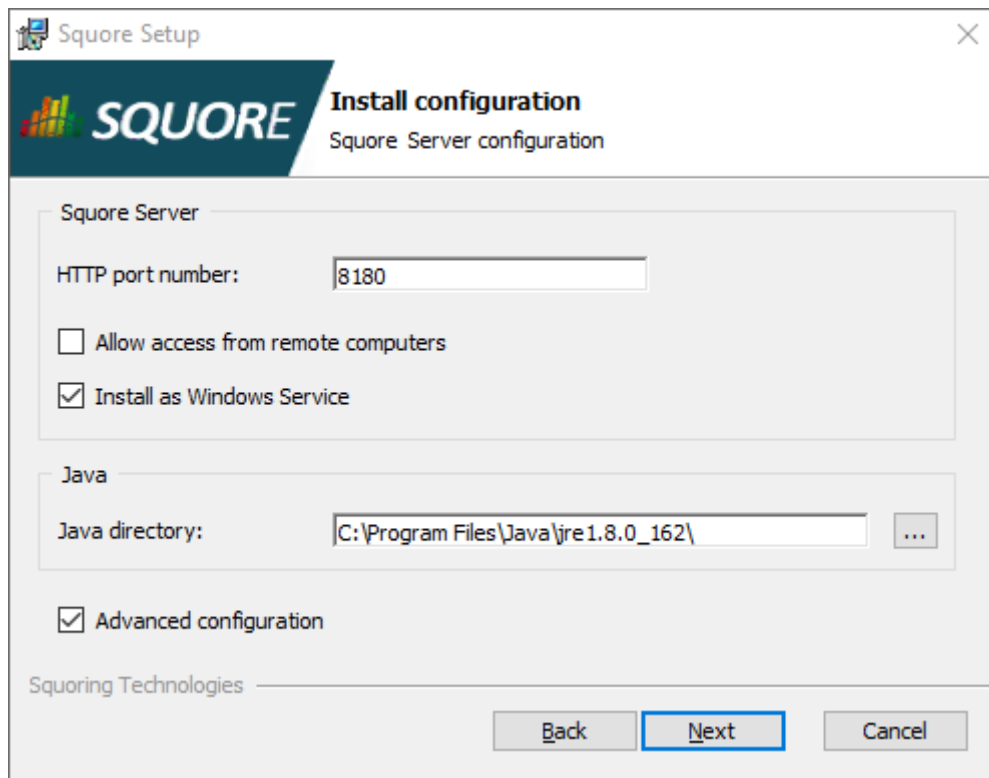
The Data Folder and Licence screen

The Squore Data Folder and Licence screen allows specifying where Squore stores its data and which licence file is used for the installation.

- **Data Folder:** The data folder is the main folder where the data generated by Squore will be stored. Define a path on your system to hold the data. By default, the database cluster, the temporary folder, the project data, the configuration workspace and the default backup folder will live in this location. Note that you can refine each individual location later by going through the advanced option screens of the installation wizard.
- **Licence File:** The location of the Squore licence file you wish to use for your installation. Note that you can leave this field empty at this time and provide the licence information only after the installation procedure has finished. This is explained in further details in Section 5.18, “Updating the Squore Licence File”.

After specifying the data location and optionally pointing to a licence file, click the **Next** button.

6. The Server Configuration screen



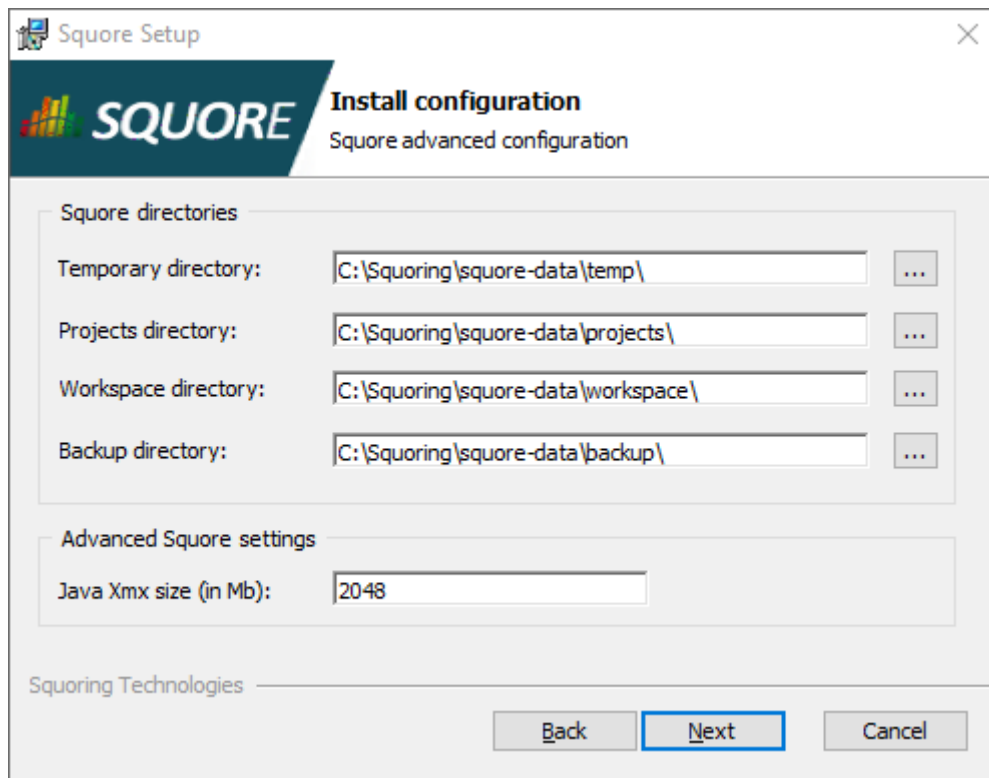
The Server Configuration screen

The Server Configuration screen allows specifying the rest of the necessary, basic options for your installation.

- **HTTP port number:** Define the port used to access Squore from your browser.
- **Allow access from remote computers:** Check this box to allow other computers on your network to connect to the Squore installation from a web browser. This setting is off by default to provide a safe installation that is only accessible from the server machine itself. The value can be changed after the installation process finishes by following the steps detailed on http://openwiki.squoring.com/openwiki/index.php/Connect_remotely_to_the_server.
- **Install as Windows service:** Check this box if you want to be able to start and stop Squore Server using a Windows service. You can optionally customise the service name when clicking the **Next** button.
- **Java directory:** the directory where the Oracle JRE is installed. The wizard should have found the appropriate Java installation on your server, but you can modify the value if the JRE you want to use is in a different location using the ... button. Note that Java 8 (other versions are not supported) is required (see Section 3.1, "Installation Prerequisites").
- **Advanced configuration:** Check this box to see more installation options for advanced users. Advanced options include finer control over data folder locations, memory settings, and advanced database configuration (like using a remote PostgreSQL installation or an Oracle database).

After setting your preferences, click the **Next** button to view a summary of your installation settings (step 14) or proceed with the advanced configuration options (step 7).

7. The Advanced Squore configuration screen



The Advanced Squore configuration screen

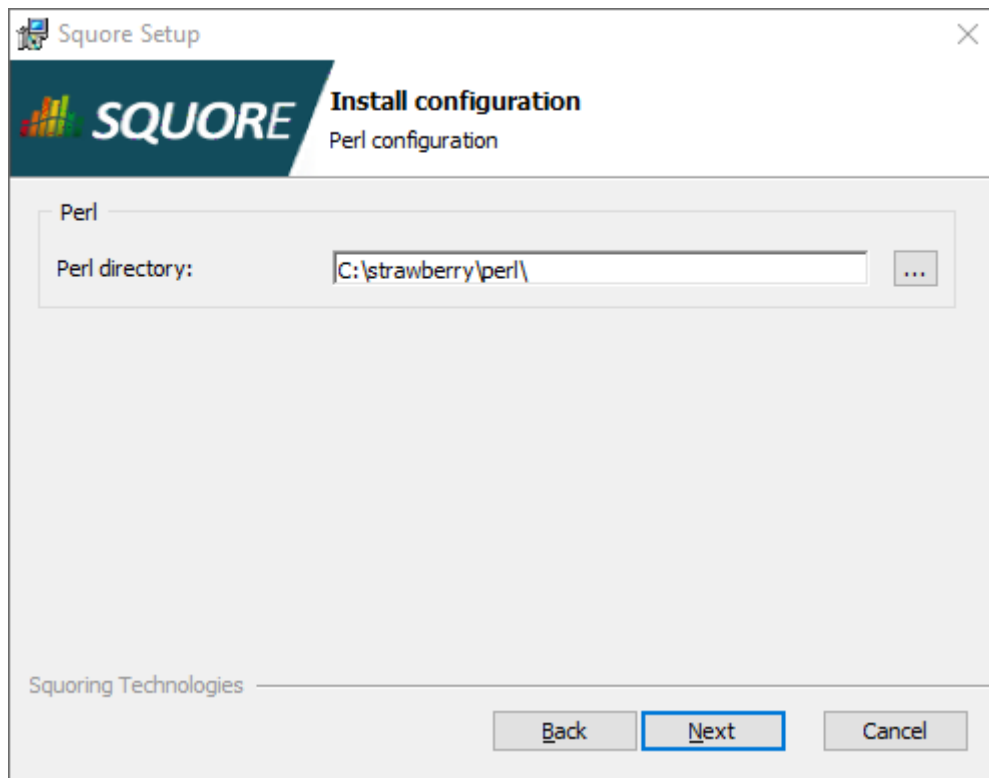
Note

This screen is only displayed if you checked the **Advanced configuration** box in step 6.

On the Advanced configuration screen, you can modify the default work directory and memory and performance settings for the server.

- **Temporary directory:** The location of the temporary data generated by Squore.
- **Projects directory:** The location of the data generated by Squore when running analyses on the server.
- **Workspace directory:** The location where changes to your analysis models and dashboards made in the web interface are stored on disk.
- **Backup directory:** The location used to store backups when the backup script is launched. For more details about backing up your Squore data, see Section 5.3.1, “Backing-Up the Squore Data”
- **Java Xmx size (in Mb):** The maximum amount of RAM available to Squore Server, set to 25% of the physical RAM available on your server by default. It is recommended to keep the memory allocated to Squore under 25% of the total physical RAM so that other Squore modules (especially the database) or external processes (the OS and some Data Providers like Checkstyle or FindBugs) still have enough resources available. This setting can be changed after installation by following the procedure described in Section 5.12, “Changing the Java Heap Size”.

8. The Perl selection screen



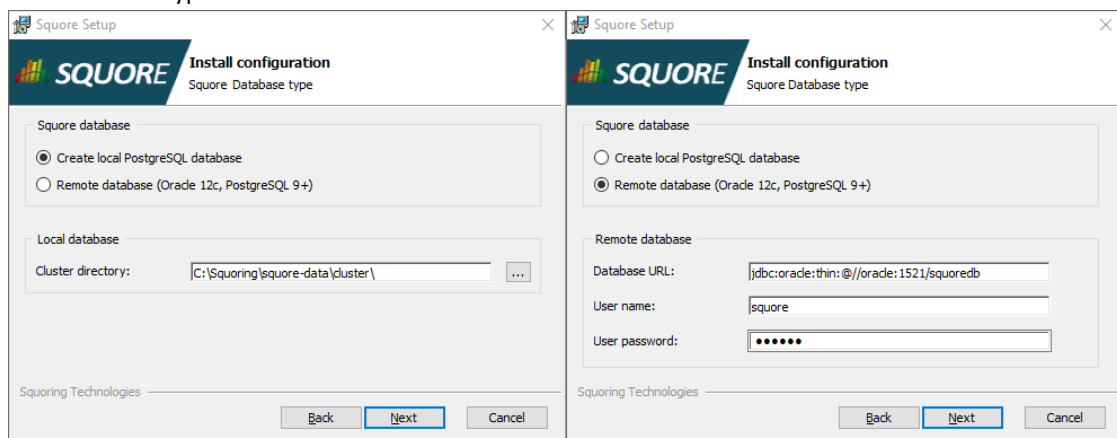
The Perl selection screen

Note

This screen is only displayed if you disabled the installation of Strawberry Perl 5.12.3.0 Portable box in step 4.

On the Perl selection screen, you can modify the path to the Perl distribution that will be used by Squore Server. Use the ... button to specify the Perl installation folder and click the **Next** button to continue.

9. The Database Type screen



The Database Type screen options for local and remote databases

On the Database Type screen, you can specify if your Squore Server installation should use a local PostgreSQL cluster or a database on a remote DBMS.

In order to use a local PostgreSQL cluster, modify the path to the PostgreSQL installation that will be used by the installer to create the Squore database. Use the ... button to specify the installation folder and click the **Next** button to continue.

In order to use a remote database backend, specify its URL and provide the username and password of a dedicated user for the Squore installation.

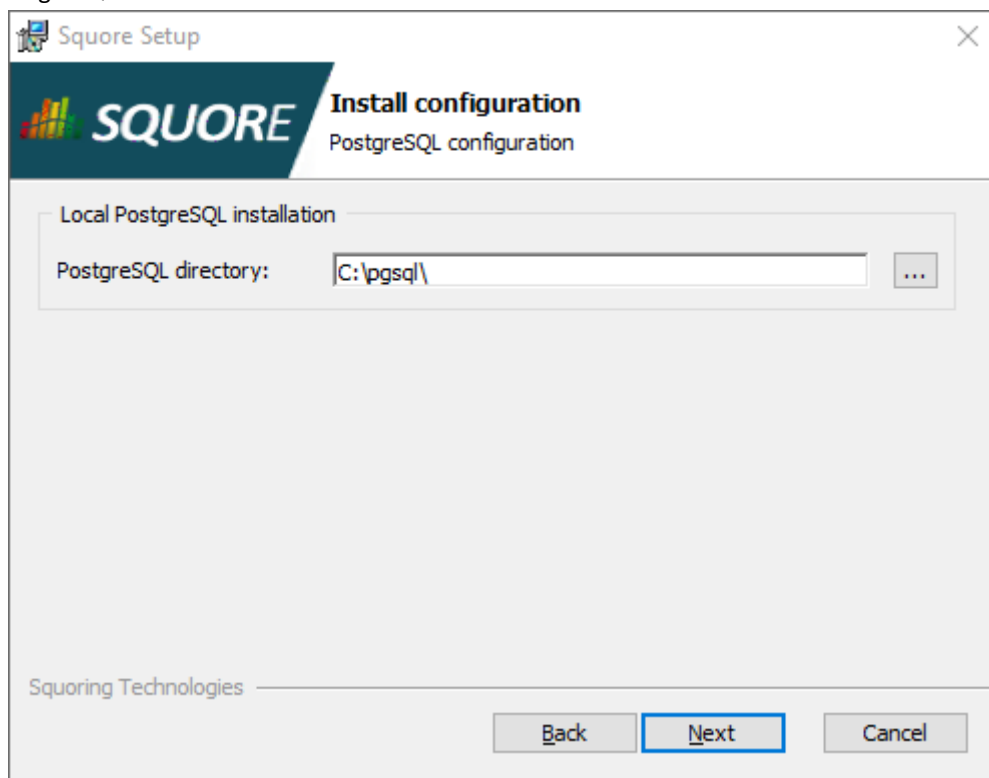
Tip

The syntax for the database URL is:

→ **jdbc:oracle:thin:@//host:port/sid** for Oracle

→ **jdbc:postgresql://host:port/dbname** for PostgreSQL

Click the **Next** button to continue, after making sure that the database URL and credentials are correct.

10. The PostgreSQL selection screen

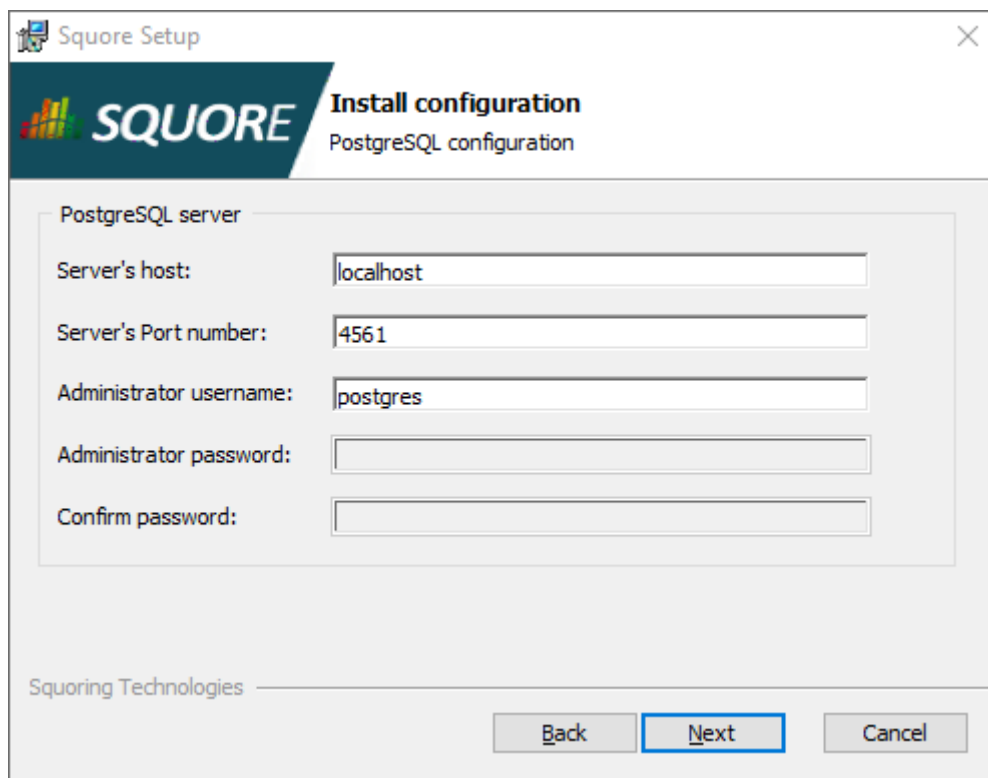
The PostgreSQL selection screen

Note

This screen is only displayed if you disabled the installation of PostgreSQL box in step 4.

On the PostgreSQL selection screen, you can modify the path to the local PostgreSQL installation that will be used by Squore Server. Use the ... button to specify the PostgreSQL installation folder and click the **Next** button to continue.

11. The PostgreSQL server configuration screen



The PostgreSQL server configuration screen

Note

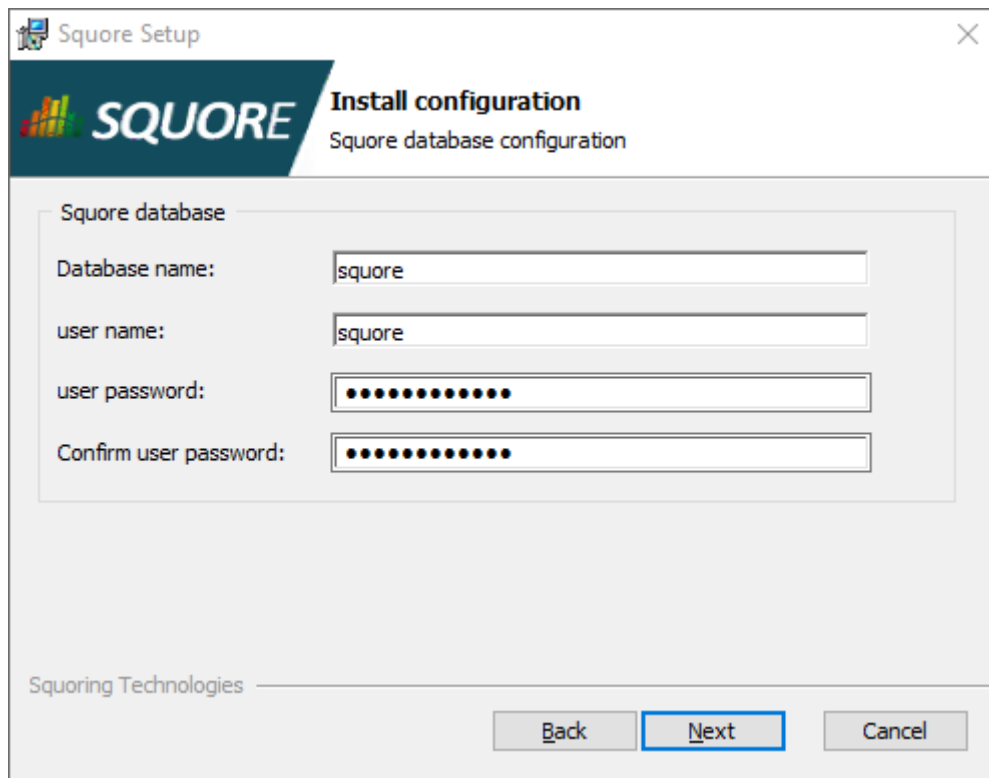
This screen is only displayed if you checked the **Advanced configuration** box in step 6 and are using a local PostgreSQL database.

On the PostgreSQL server configuration screen, you can provide details about the PostgreSQL server to be used with Squore Server

- **Server's host:** the hostname of the machine running the PostgreSQL server
- **Server's port number:** the running port of the PostgreSQL server
- **Administrator user name:** the user name of the PostgreSQL server admin user

Note that the Administrator password cannot be set. After adjusting your settings, click the **Next** button to continue.

12. The Squore database configuration screen



The Squore database configuration screen

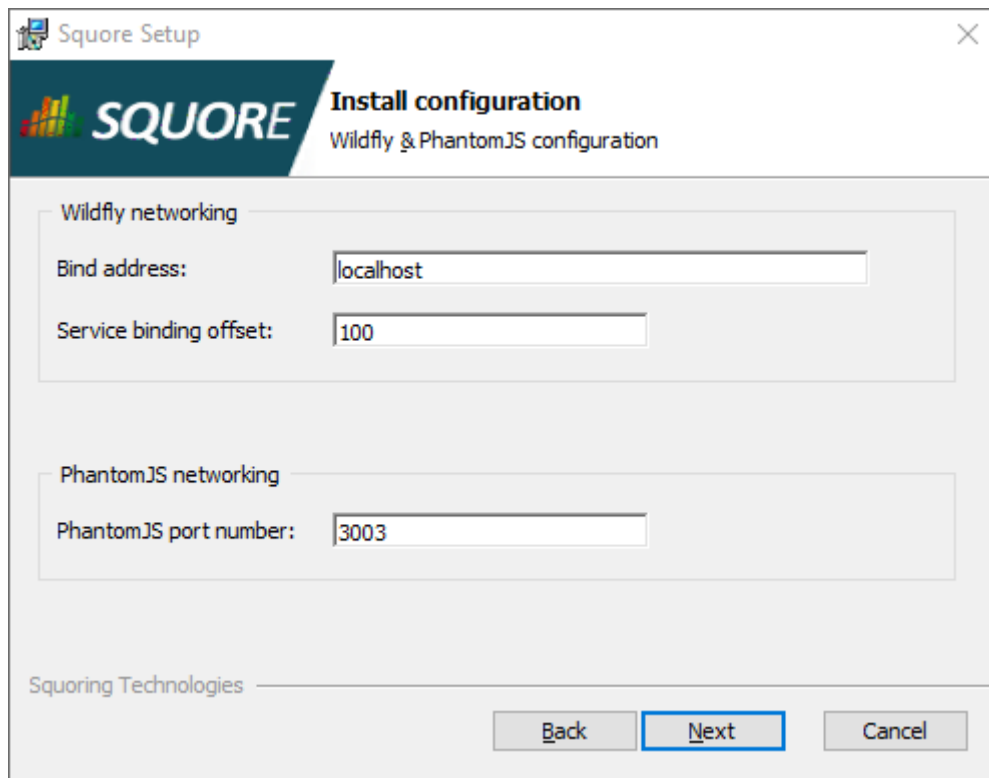
Note

This screen is only displayed if you checked the **Advanced configuration** box in step 6 and are using a local PostgreSQL database.

On the Squore database configuration screen, you can specify the desired name and user for the Squore database:

- **Database name:** the name of the database that will be created for this installation of Squore
 - **user name:** the name of the user that will be created as the owner of the database
 - **user password:** the password for the specified database user
- After adjusting your settings, click the **Next** button to continue.

13. The WildFly and PhantomJS Configuration screen



The WildFly and PhantomJS Configuration screen

Note

This screen is only displayed if you checked the **Advanced configuration** box in step 6.

On the WildFly and PhantomJS Configuration screen, you can specify the desired bind address and ports for Squore Server, as well as the port to use for the PhantomJS server:

- **Bind address:** the bind-address configuration for the WildFly Server
If you want to restrict access to Squore Server from the server itself, leave `localhost`. If you want your server to be accessible from anywhere on your network, set the bind address to `0.0.0.0`.
- **Service binding offset:** the offset added to the value of the default WildFly ports (as described on <https://docs.jboss.org/author/display/WFLY10/Interfaces+and+ports#Interfacesandports-SocketBindingGroups>) for this installation of Squore, resulting in the following ports being assigned for the following offset values:
 - 100 (default): http: 8180, https: 8543, management: 10090
 - 200: http: 8280, https: 8643, management: 10190
 - 300: http: 8380, https: 8743, management: 10290

Tip

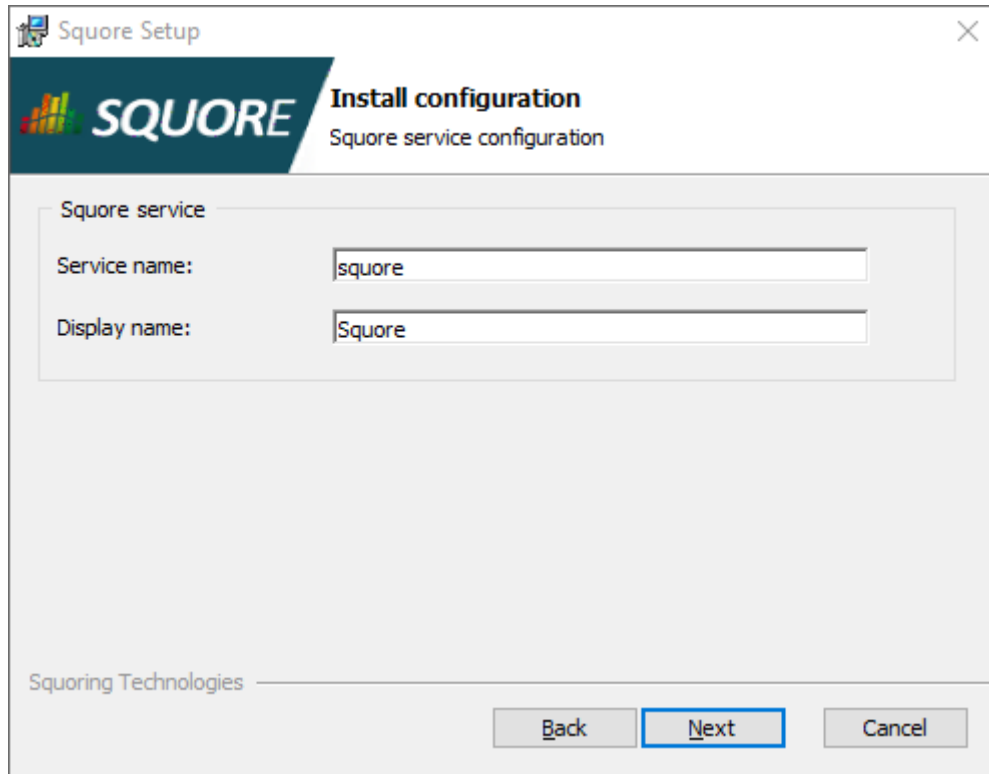
The offset is mainly used to install several instances of Squore using different ports on the same machine, or to configure the installation to use a different port when 8180 is already by another application used on the machine.

- **PhantomJS port number:** Choose the port used for the PhantomJS server. Note that all communication between Squore Server and PhantomJS happens on the same machine. This port therefore does not

need to be open on your firewall, except in very specific scenarios described in Section 5.4, “Advanced PhantomJS Settings”.

After adjusting your settings, click the **Next** button to continue.

14. The Windows Service screen



The Windows Service screen

Note

This screen is only displayed if you checked the **Install as Windows service** box in step 6.

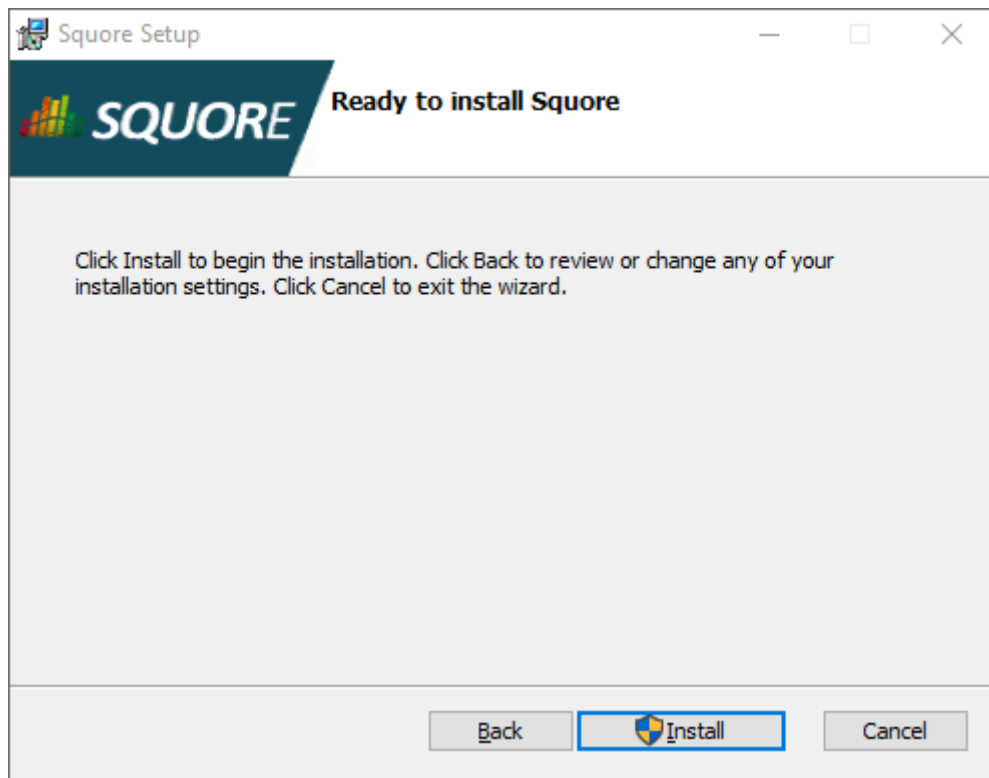
On the Windows Service screen, you can specify the desired name and display name for service that controls Squore Server.

Tip

For a Windows Service, the name is the alias used in the command line (for example: `net start square`), and the display name (Squore) is the name displayed in the graphical Windows Services Console.

Set the name and display name for the service according to you needs and click the **Next** button to continue.

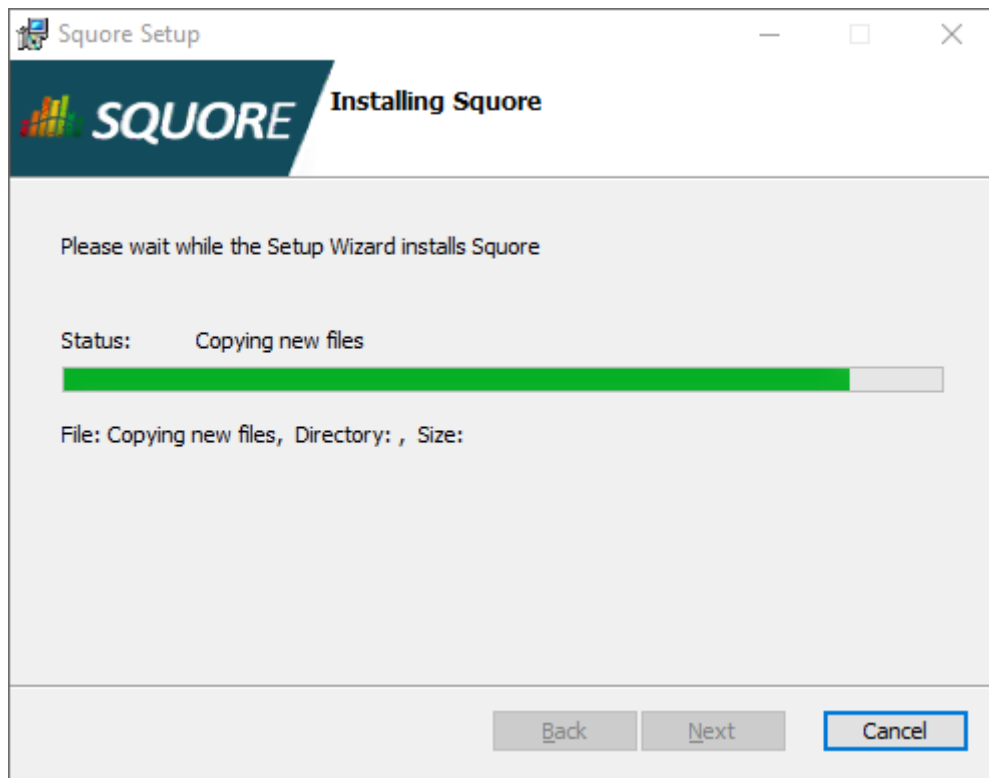
15. The Confirmation screen



The Confirmation screen

The Confirmation screen is the last screen displayed before the installation starts. Go back and verify your selections if needed, otherwise click **Install** to start installing Squore. The installation process lasts a few minutes.

16. The Installation progress screen



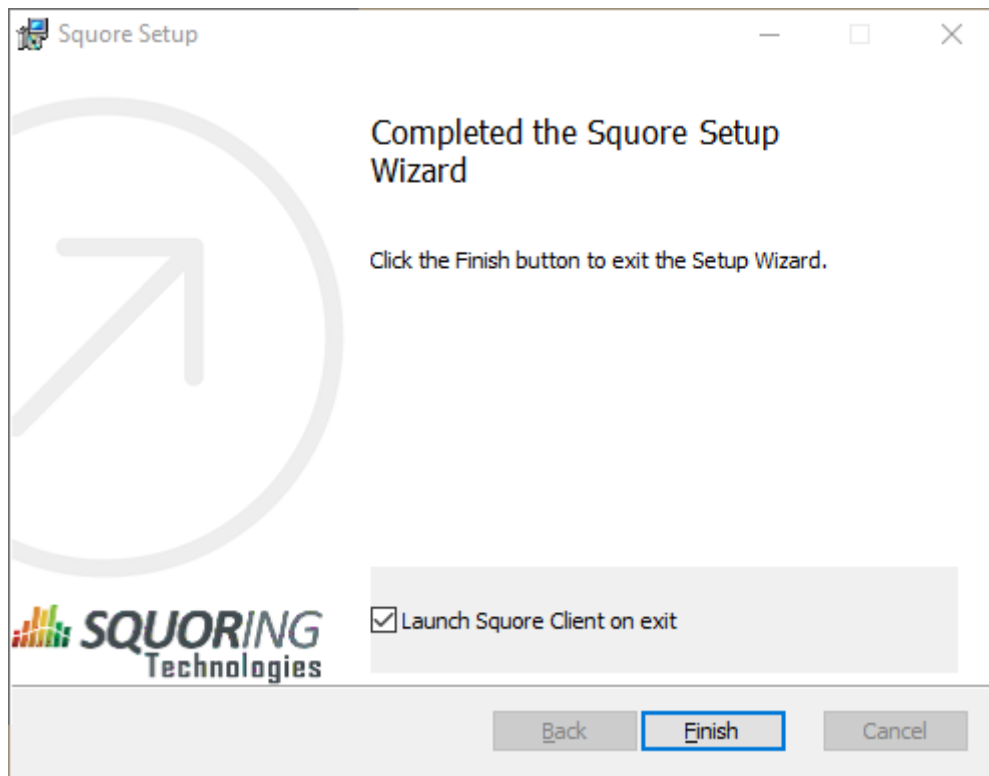
The Installation progress screen

During the installation, a progress bar is displayed while files are copied to your hard drive.

Note

The installation cannot be cancelled after it has started.

17. The Squore installation completed screen



The Squore installation completed screen

When the installation completes, the installation completed screen is displayed. Click the **Finish** button to close the Squore Installation Wizard. You can use the **Start Client** shortcut on your desktop to open the Squore Login page in your browser.

Tip

If you check the **Launch Squore Client on exit** box on this screen, Squore will open automatically in your browser.

Squore is now ready for use and can be accessed via `http://localhost:8180/SQuORE_Server`. Refer to Chapter 4, *Starting and Stopping Squore* if you need more information about how to start and stop Squore and, if applicable, change the default configuration.

3.4. Installing Squore Server on Linux

Before installing Squore on a Linux platform, verify that all prerequisites are met, as described in Section 3.1, “Installation Prerequisites”

If you use all the default settings, the installer will deploy the following components in the specified locations:

- Squore Server (including its dedicated WildFly instance) in `<SQUORE_HOME>`
- The Squore projects directory in `<SQUORE_DATA>/projects`
- The Squore workspace directory in `<SQUORE_DATA>/workspace`
- The Squore database cluster directory in `<SQUORE_DATA>/cluster`
- The Squore database backup directory in `<SQUORE_DATA>/backup`

- The Squore temporary data directory in `/tmp/squore`
- The Squore temporary source code directory in `/tmp/squore/sources`

Ensure that the user that installs and runs Squore has read and write access to these locations.

Note

The installation script will try to guess the amount of memory to allocate for the database on your system. If it cannot do it, you will get an error message about setting `kernel.shmall`. In this case, you need to set the value of `kernel.shmall` to a value that suits your need, based on which other applications are running on your system. The script will only suggest a minimum value.

Follow these instructions to install Squore Server:

Warning

Do not run the installation script as root, as this causes the installation of PostgreSQL to fail. Ensure that the user performing the installation has write-access to the folder used for installation.

1. Copy the installation package (`squore-18.0.18-linux-x86_64.tar.bz2`) into the location where you want to install Squore Server (For example: `/opt/squore/`).
2. Extract the contents of the archive into the selected installation directory.
The folder now contains a new folder called `squore-server`, which we will refer to as `<SQUORE_HOME>`.
3. Run the Squore installation script in a command shell. The full list of options accepted by the `install` script can be found in `install(1)`, but the command below is usually enough for most installations:

```
<SQUORE_HOME>/bin/install -b 0.0.0.0 -k /path/to/squore-license.p7s /path/to/project/data
```

Tip

You can perform the installation even if you do not have a licence file yet. For more information, consult Section 3.1.6, “Obtaining a Licence File”.

4. Read and accept the licence agreement

Tip

If you want Squore Server to use a remote database backend, consult `install(1)` to find out more about the parameters available to set the remote database type, name and location.

3.5. Third-Party Plugins and Applications

End users can run third-party static code analysers or rule checkers that are not shipped with the Squore installer for licencing reasons. In this case, it is necessary to download the extra binaries from https://support.squoring.com/download_area.php and deploy them on the server.

The list of third party plugins to be downloaded separately is as follows:

- Checkstyle 5.6
- FindBugs 3.0
- Cppcheck 1.61
- PMD 5.0.5
- Polyspace Export
- Stylecop 4.7

Here is a full example of how to deploy Checkstyle into Squore

1. Download the Checkstyle binary from https://support.squoring.com/download_area.php.
2. Extract the contents of the zip file onto Squore Server.
3. Copy the extracted checkstyle-5.6 folder into `<SQUORE_HOME>/addons/tools/CheckStyle_auto`.
4. Instruct all client installations to synchronise with the server so that they get the newly deployed third-party binaries.

If you have deployed some third-party tools on Squore Server, they will automatically be downloaded to your client when you launch the client synchronisation script.

Tip

AntiC and Cppcheck on Linux also require special attention: Cppcheck must be installed and available in the path, and antiC must be compiled with the command:

```
cd <SQUORE_HOME>/addons/Antic_auto/bin/ && gcc antic.c -o antic
```

For more information, refer to the Command Line Interface Manual, which contains the full details about special installation procedures for Data Providers and Repository Connectors.

3.6. Upgrading from a Previous Version

The Squore installation package can be used to upgrade an existing Squore installation from Squore 2013-B-SP3.

When an installation is upgraded, the following happens:

- The new version of Squore Server overwrites the previous one in the same installation directory.
- The database is upgraded.
- The data files are migrated.
- The old basic configuration is kept: location of data, cluster and tmp folders as well as ports.
- LDAP settings, licence server sharing, SSL configuration are discarded and will need to be configured again. The old `<SQUORE_HOME>/config.xml` and `<SQUORE_HOME>/server/standalone/configuration/standalone.xml` are backed up for your convenience next to the new ones (i.e. `<SQUORE_HOME>/config.xml.bkp` and `<SQUORE_HOME>/server/standalone/configuration/standalone.xml.bkp`).

3.6.1. On Windows

Warning

- Ensure you have a backup of your data before attempting an upgrade. When an upgrade fails, restore the previous Squore installation and its data before attempting the upgrade again.
- The java version required by the new version of Squore may be different from the one you were using in your previous installation. On Windows, an installer screen will prompt you for the path to the new Java installation to use after upgrading. On Linux, you can use the `-J` option to specify the new path to Java in your upgrade command line.
- Before upgrading from a pre-16.0 version, ensure that you have as much free space on your disk as the size of your current database, as reported on Administration > Projects.
- Upgrading from a pre-18.0 version on Windows will migrate your cluster from PostgreSQL 8.4 to PostgreSQL 9.6. This migration takes place in Squore's temp folder (as configured in) and requires

as much free space as the current size of your database. Make sure you free up space before starting the upgrade.

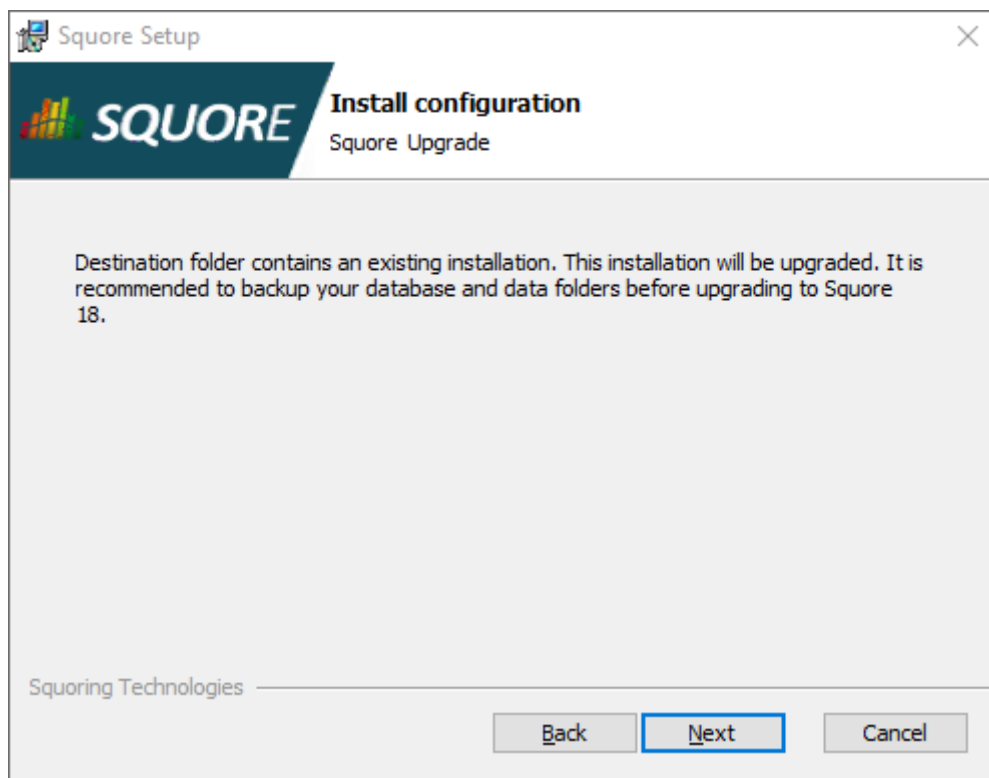
- **Folders inside the installation directory are deleted during an upgrade**, including the default tmp, data, cluster and backup folders. Before you attempt to upgrade Squore, run a full backup of your data (and move it outside <SQUORE_HOME>) using the provided backup scripts described in Section 5.3.1, “Backing-Up the Squore Data”
- **On Linux, if you used the -x and/or -s parameters in your initial installation or if you manually edited the value of PostgreSQL's shared_buffer or java Xmx parameters after installing**, you must pass -x and/or -s on the command line for the upgrade as well, as they are not read from the previous installation. For more details on **install** options, refer to `install(1)`.
- The file `postgresql.conf` in your database cluster is patched during the upgrade process. If you have modified it manually, create a backup copy before upgrading and verify that the migrated file still contains your modifications.
- If you are a local PostgreSQL cluster as your database, ensure that the server and the database are shut down before continuing. In all other scenarios (an Oracle database or a remote PostgreSQL cluster not managed by Squore) ensure that Squore Server is stopped and that the database is accessible and accepting connections.
- No progress information is displayed on screen during the database upgrade phase, which may take a while to complete.

Follow these steps to upgrade your Windows installation.

Tip

Running the Windows installer generates a log file in <SQUORE_HOME>\install.log, which you can consult if you think there is an issue with your installation. When an installation or upgrade fails, the operation is rolled back in an attempt to remove all files in the selected installation folder. When this happens, the log file can be found in %LOCALAPPDATA%\Temp\install.log instead.

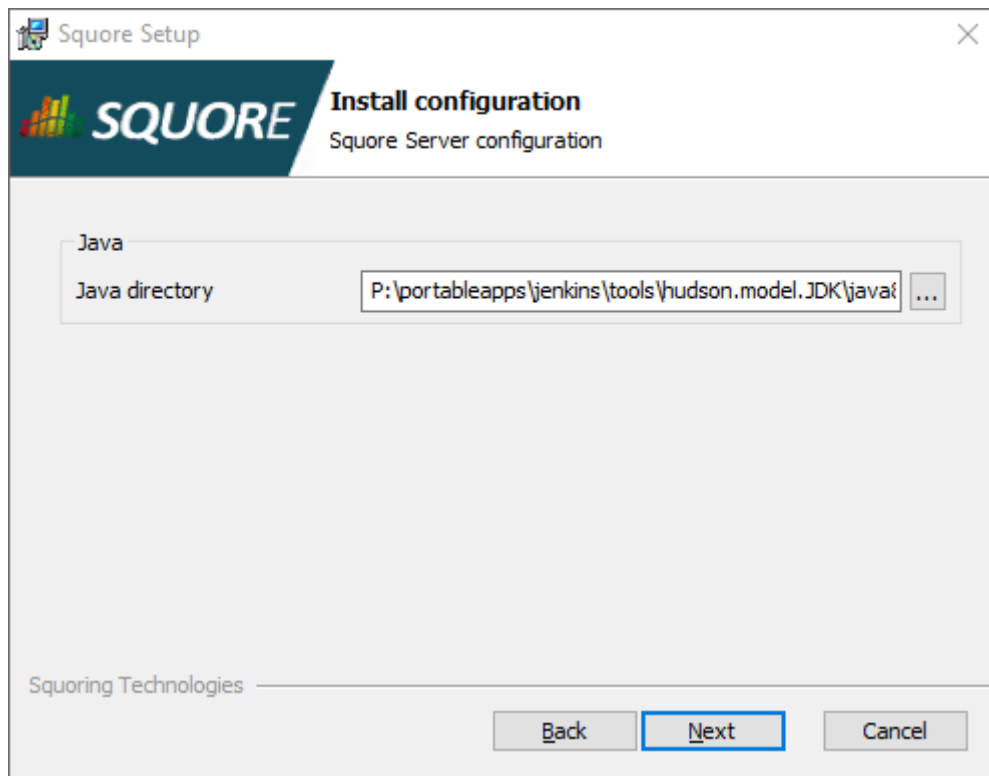
1. Run the Windows installer.
2. Click the **Next** button to get to the Licence Agreement screen.
3. Click the **Next** button to get to the Destination Folder screen.
4. Browse for the folder containing the old installation and click the **Next** button.
5. On the Upgrade screen, the installer confirms that the selected folder contains an older Squore installation.



The Upgrade screen

Click the the **Next** button button to continue with the upgrade.

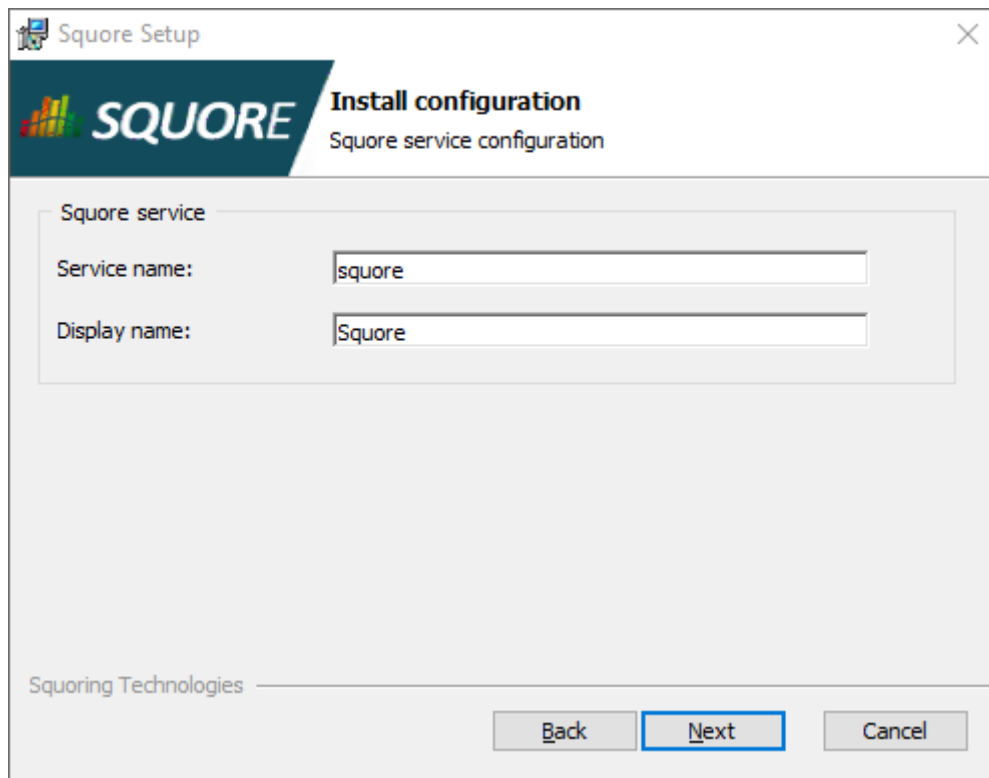
6. If you are running an unsupported Java version, you will see the following screen, where you can specify the path to the new Java version:



The Squore Setup screen for the new Java directory

Specify the path to the new Java installation and click the **Next** button to continue with the upgrade.

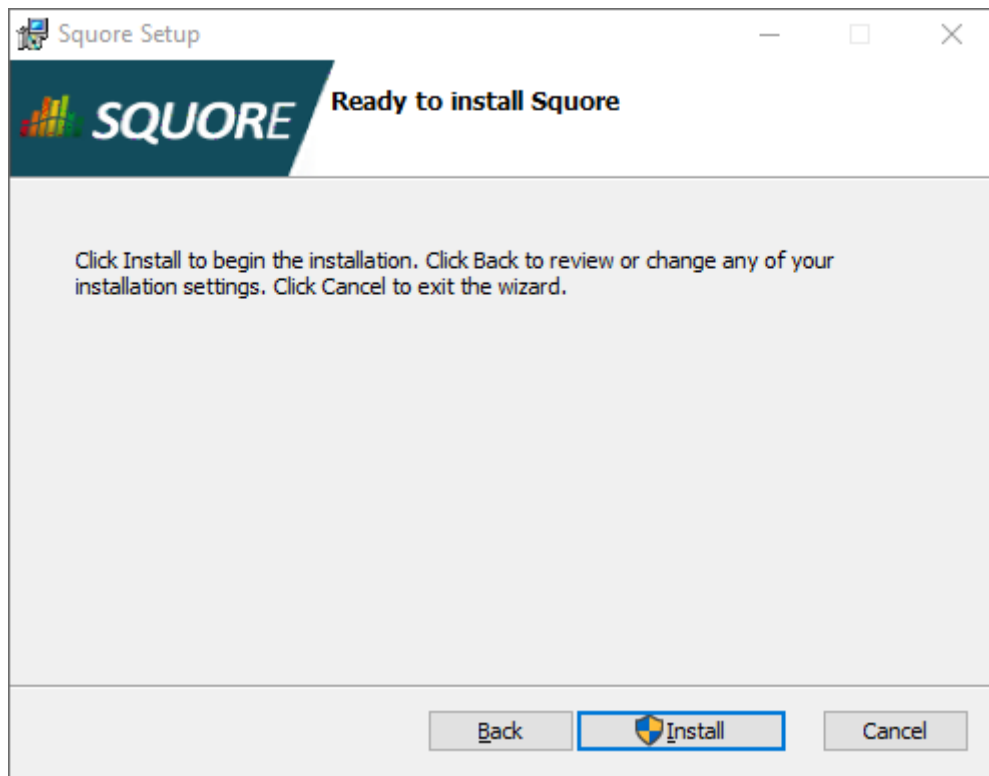
7. If you are migrating from a pre-17.0 version and used Windows services, you will see the following screen, where you can choose the name of the new Squore service:



The Windows Service screen

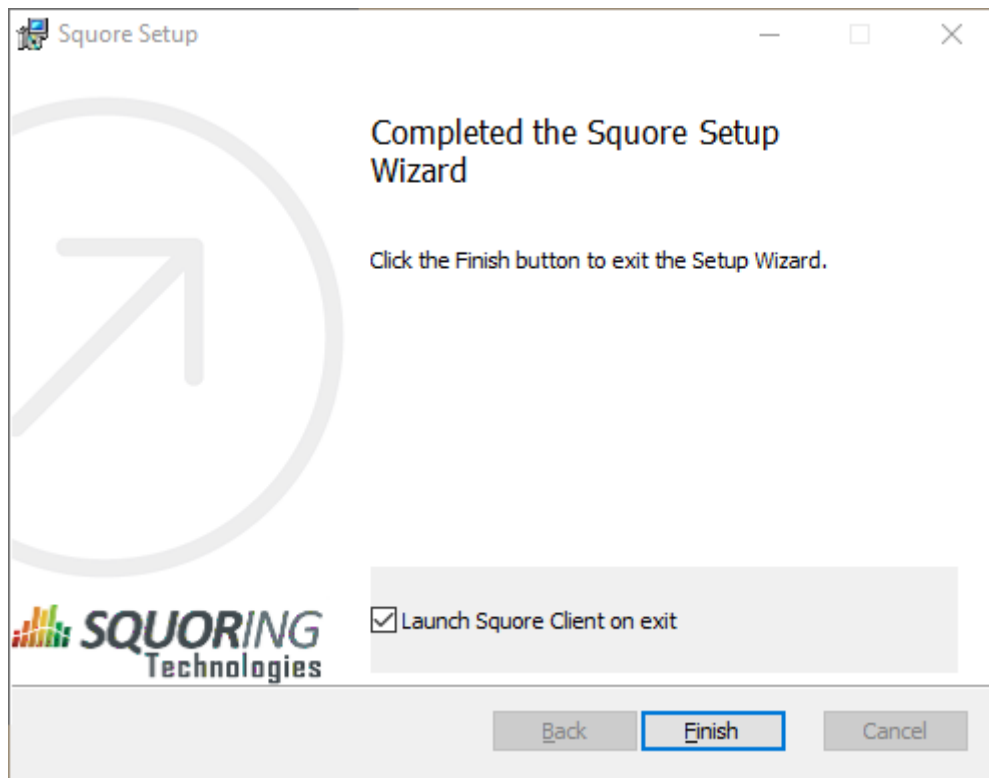
Specify the name and display name of the Windows service and click the **Next** button to continue with the upgrade.

8. The Confirmation screen is the final step before the upgrade starts. If you are satisfied with your selections and have enough free space to proceed, click **Install**.



The Confirmation screen

9. Wait for the upgrade process to complete and close the wizard by clicking on **Finish**.



The Installation Complete screen

3.6.2. On Linux

Warning

- Ensure you have a backup of your data before attempting an upgrade. When an upgrade fails, restore the previous Squore installation and its data before attempting the upgrade again.
- The java version required by the new version of Squore may be different from the one you were using in your previous installation. On Windows, an installer screen will prompt you for the path to the new Java installation to use after upgrading. On Linux, you can use the -J option to specify the new path to Java in your upgrade command line.
- Before upgrading from a pre-16.0 version, ensure that you have as much free space on your disk as the size of your current database, as reported on Administration > Projects.
- Upgrading from a pre-18.0 version on Windows will migrate your cluster from PostgreSQL 8.4 to PostgreSQL 9.6. This migration takes place in Squore's temp folder (as configured in) and requires as much free space as the current size of your database. Make sure you free up space before starting the upgrade.
- **Folders inside the installation directory are deleted during an upgrade**, including the default tmp, data, cluster and backup folders. Before you attempt to upgrade Squore, run a full backup of your data (and move it outside <SQUORE_HOME>) using the provided backup scripts described in Section 5.3.1, “Backing-Up the Squore Data”
- **On Linux, if you used the -x and/or -s parameters in your initial installation or if you manually edited the value of PostgreSQL's shared_buffer or java Xmx parameters after installing**, you must pass -x and/or -s on the command line for the upgrade as well, as they are not read from the previous installation. For more details on **install** options, refer to `install(1)`.

- The file `postgresql.conf` in your database cluster is patched during the upgrade process. If you have modified it manually, create a backup copy before upgrading and verify that the migrated file still contains your modifications.
- If you are a local PostgreSQL cluster as your database, ensure that the server and the database are shut down before continuing. In all other scenarios (an Oracle database or a remote PostgreSQL cluster not managed by Squore) ensure that Squore Server is stopped and that the database is accessible and accepting connections.
- No progress information is displayed on screen during the database upgrade phase, which may take a while to complete.

Follow these steps to upgrade your Linux installation.

1. Download the Linux installation package.
2. Extract the archive by running the command:

```
cd /tmp  
  
/usr/bin/tar xjf squore-18.0.18-linux-x86_64.tar.bz2
```
3. Manually backup your current `<SQUORE_HOME>/server/bin/standalone.conf`
4. Run the upgrade by executing:

```
cd /tmp/squore-server/bin  
  
./install -U /path/to/old/installation [options...]
```
5. Redeploy your backed-up `<SQUORE_HOME>/server/bin/standalone.conf` if necessary to reapply your custom configurations.

3.7. Uninstalling Squore Server

3.7.1. On Windows

Squore Server, can be removed from your system from Windows' Add/Remove Programs dialog in the control panel.

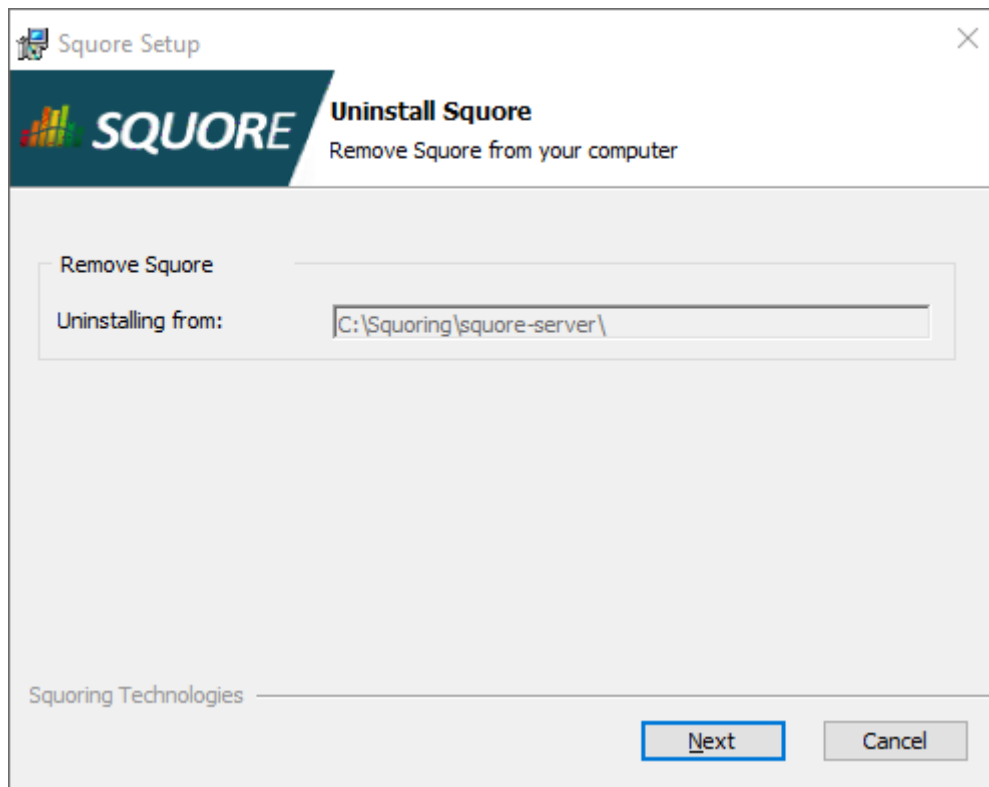
Note

Windows provides two options to manage the installation:

- **Uninstall** removes all the files created at installation time, but leaves the data folder as well as some log and temporary files behind that need to be removed manually
- **Modify (or Change)** displays the installation wizard and allows you to choose if your data should be kept or removed from your computer

This section describes the **Modify (or Change)** method, which offers full control over what files are kept or removed from your system.

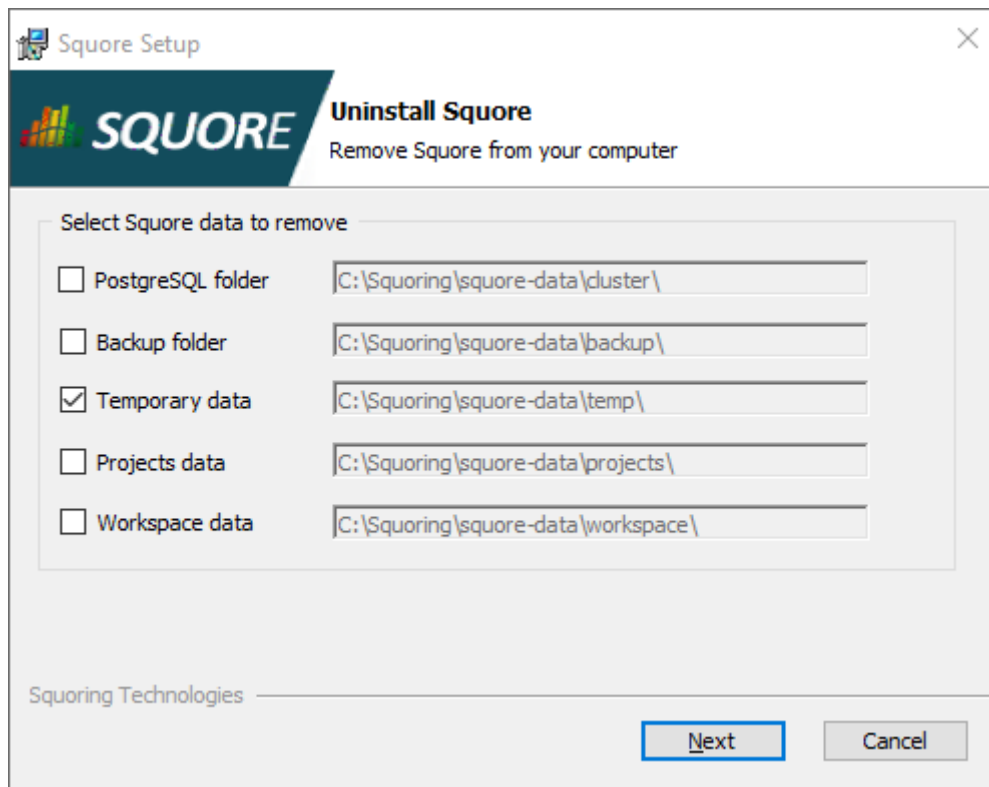
1. Stop Squore Server by running `<SQUORE_HOME>/stop.bat` or stopping the Squore service.
2. Launch the installer. The wizard opens:



The Squore Server uninstallation wizard

Click the **Next** button to go to the next screen.

3. The wizard will prompt you which of the data folders created by Squore Server to remove from your machine:



The Folder Selection screen

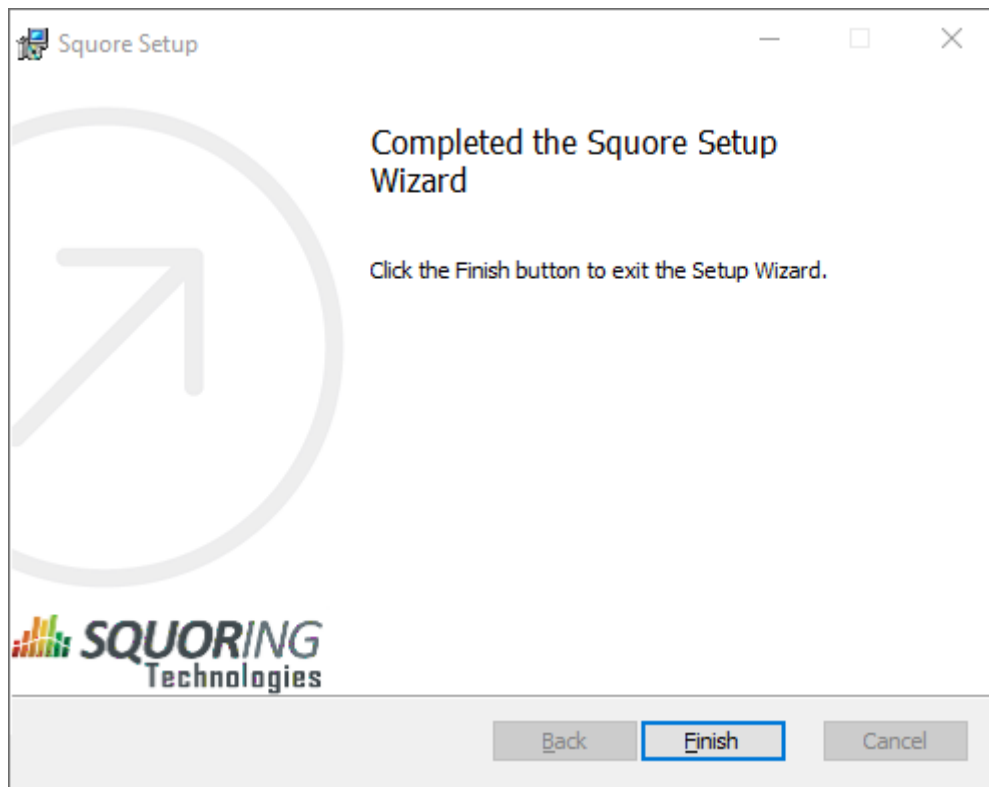
The data generated by Squore Server is left on the machine by default. If you do not need it, check all the boxes to delete all the folders.

Click **the Next button** and **Remove** on the confirmation screen to proceed with the removal of the software and the selected data.

Warning

This operation cannot be interrupted or rolled-back.

4. The wizard will notify you when the uninstallation finishes, as shown below:



The Setup Complete screen

Click **Finish** to exit the wizard.

3.7.2. On Linux

There is no uninstallation script for Squore Server on linux. In order to completely remove Squore Server from your system:

1. Ensure that Squore Server is completely stopped by running:
`<SQUORE_HOME>/bin/sqctl stop`
2. Delete the folders where Squore Server generated data:
 - The database cluster
 - The projects folder
 - The temp folder
 - The sources folder
 - The workspace folder

Tip

You can identify these locations by looking at `<SQUORE_HOME>/config.xml`, as described in Section 5.2, "Understanding `config.xml`".

3. Delete `<SQUORE_HOME>`, the folder containing `config.xml` and the Squore binaries.

4. Starting and Stopping Squore

4.1. On Windows

If you installed Squore as a Windows service, you can start and stop Squore from the Services Console:

1. Open the **Control Panel**
2. Go to **Administrative Tools > Services**
3. Find the **Squore** service and select the start or stop command

If you did not install Squore as a Windows service, you can use the start and stop scripts in `<SQUORE_HOME>\bin`:

- **start-db.bat** starts the database
- **start-server.bat** starts the web server
- **start.bat** performs the two previous operations in succession
- **stop-server.bat** terminates the web server
- **stop-db.bat** stops the database
- **stop.bat** performs the two previous operations in succession

4.2. On Linux

1. Go to the Squore bin directory `cd <SQUORE_HOME>/bin`
2. Use the sqctl launcher to start and stop Squore:

```
./sqctl start|stop|restart|status
```

Tip

If you need to start the database only, use

```
./pgctl start|stop|restart
```

4.3. Your First Login

After starting Squore, you can access the login page by typing the following address in a web browser:
`http://localhost:8180/SquORE_Server`

Tip

Squore ships with two built-in users that you can use to login:

- **admin** (password: admin) is the admin account you can use to configure the system.
- **demo** (password: demo) is the regular account to use to rate projects and discover the rest of the functionality in Squore.

For more information about what to try out next in Squore, consult our Getting Started Guide.

5. Squore Administration

5.1. Getting to Know the Installation Folder

During the installation process, the Squore Installation Wizard creates several folders and files in the Squore installation directory `<SQUORE_HOME>` :

`<SQUORE_HOME>/addons` contains the Data Providers and Repository Connectors available in Squore

`<SQUORE_HOME>/bin` contains scripts to start, stop and manage Squore.

`<SQUORE_HOME>/configuration` contains folders and files that provide the default analysis and decision models, as well as the default dashboards for these models. For more details on how to understand and use these configuration files, refer to the Squore Configuration Guide.

`<SQUORE_HOME>/database` contains scripts used to create and reset the database.

`<SQUORE_HOME>/deploy` contains a copy of the web applications deployed during the installation.

`<SQUORE_HOME>/docs` contains licences for third party libraries included in Squore and a copy of the Squore documentation.

`<SQUORE_HOME>/eclipse` contains the Squore Eclipse plugin that developers can install in their IDE. For more information, consult the Eclipse Plugin Guide.

`<SQUORE_HOME>/lib` contains runtime libraries used by Squore Server.

`<SQUORE_HOME>/samples` contains some sample source code in various programming languages that can be used as examples when getting to know Squore. This folder can safely be deleted if you do not need it.

`<SQUORE_HOME>/server` contains the Squore application server. See Section 2.3, “The Squore Application Server” for more information.

`<SQUORE_HOME>/share` contains some custom perl modules and other files needed to run the web applications.

`<SQUORE_HOME>/tools` contains the local instances of perl, tclsh, PostgreSQL and .

`<SQUORE_HOME>/util` (Windows-only) contains scripts used during the installation.

`<SQUORE_HOME>/config.xml` is used to specify the location of some configuration folders. See Section 5.2, “Understanding `config.xml`” for more information.

5.2. Understanding `config.xml`

Note

This section deals with editing the configuration of the installed instance of Squore. For more information about how to edit analysis models and wizards, refer to the Squore Configuration Guide.

5.2.1. Default Configuration

The initial contents of `<SQUORE_HOME>/config.xml` are as follows:

```
<?xml version="1.0" encoding="utf-8" standalone="yes"?>
<squore type="server" version="1.3">
```

```
<paths>
  <path name="perl.dir" path="C:\Squoring\squore-server\tools\perl\perl" />
  <path name="tclsh.dir" path="C:\Squoring\squore-server\tools\tclsh" />
</paths>
<database>
  <postgresql directory="C:\Squoring\squore-server\tools\pgsql" />
  <cluster directory="C:\Squoring\squore-data\cluster" />
  <backup directory="C:\Squoring\squore-data\backup" />
  <security>
    <user-name>postgres</user-name>
  </security>
</database>
<phantomjs>
  <socket-binding port="3003" />
</phantomjs>
<configuration>
  <path directory="C:\Squoring\squore-server\configuration" />
</configuration>
<addons>
  <path directory="C:\Squoring\squore-server\addons" />
</addons>
<tmp directory="C:\Squoring\squore-data\temp" />
<projects directory="C:\Squoring\squore-data\projects" />
<workspace directory="C:\Squoring\squore-data\workspace" />
</squore>
```

Tip

You can find the XML schema for `<SQUORE_HOME>/config.xml` in `config-1.3.xsd`.

Here is a description of each element:

- **paths/path name="perl.dir"** (mandatory) is the path to the perl installation used by Squore. It is detected automatically on Linux and set to `<SQUORE_HOME>/tools/perl/perl` on Windows.
- **paths/path name="tclsh.dir"** (mandatory) is the path to the tcl installation used by Squore. It is detected automatically on Linux and set to `<SQUORE_HOME>/tools/tclsh` on Windows.
- **database/postgresql directory="..."** (for installations using PostgreSQL only) is the path to the PostgreSQL installation used by Squore. It is detected automatically on Linux (or passed as a parameter to `./install`) and set to `<SQUORE_HOME>/tools/pgsql` on Windows.
- **database/cluster directory="..."** (for installations using a local PostgreSQL cluster only) is the path to the PostgreSQL cluster defined at installation to hold the Squore Database.
- **database/backup directory="..."** (mandatory) is the path to the folder used by Squore by default to store backups. It can be overridden by passing a path to the backup script.
- **phantomjs** (optional) allows you to specify the port used by Squore Server to communicate with the local instance of PhantomJS.
- **configurations/path directory="..."** (mandatory): Paths to one or more configuration folders. The first path listed in the list takes precedence over the next one.
- **addons/path directory="..."** (mandatory): Paths to one or more addons folders. The first path listed in the list takes precedence over the next one.
- **tmp directory="..."** (mandatory) is the path to the temporary folder used to hold temporary analysis and user session data created while the server is running (this folder is emptied at startup).
- **projects directory="..."** (mandatory) is the path to the project folder that holds analysis results. Files in this folder are included in a backup, along with the contents of the database.

- **workspace directory**="..." (new in 18.0) (mandatory) is the path to the folder where any configuration changes carried out in the user interface are saved (for example charts and dashboards modified in the Dashboard Editor).

5.2.2. Adding a Configuration Folder

In order to add a custom addons or configuration folder, simply add a `path` element in the configuration file:

```
<?xml version="1.0" encoding="utf-8" standalone="yes"?>
<squore type="server" version="1.3">
  <paths>
    ...
  </paths>
  <database>
    ...
  </database>
  <configuration>
    <path directory="C:\MyModels\configuration" />
    <path directory="C:\Squoring\squore-server\configuration" />
  </configuration>
  <addons>
    <path directory="C:\MyModels\addons" />
    <path directory="C:\Squoring\squore-server\addons" />
  </addons>
  <tmp directory="C:\Squoring\squore-data\temp" />
  <projects directory="C:\Squoring\squore-data\projects" />
  <workspace directory="C:\Squoring\squore-data\workspace" />
</squore>
```

By adding your own custom configuration and addons folder on top of the standard configuration, you ensure that the modifications you make override the definitions from the standard configuration and are not overwritten when upgrading your Squore version.

Note

The workspace folder (which contains modifications to the configuration made via the web interface) always takes precedence over the configuration folders when loading the configuration.

5.2.3. The Sources Folder

Inside of Squore's **tmp** folder is a folder called **sources** which is used to store source code that users are viewing in the web interface, and to store source code uploaded in zip files for analyses.

The **tmp** folder is deleted whenever Squore Server is restarted, causing the **sources** folder to be deleted in the process. If you need to keep the files created in the **sources** folder, you can move it outside the **tmp** folder by editing your `<SQUORE_HOME>/config.xml` as follows:

```
<?xml version="1.0" encoding="utf-8" standalone="yes"?>
<squore type="server" version="1.3">
  <paths>
    ...
  </paths>
  <database>
    ...
  </database>
  <configuration>
    ...
  </configuration>
  <addons>
```



```
...
</addons>
...
<tmp directory="..." />
<project directory="..." />
<sources directory="..." />
<workspace directory="..." />
</square>
```

By adding a `sources` element, you can specify a `directory` where source files are stored.

5.2.4. Giving Each User Their Own Temporary Folder

When several users run analyses using the command line on the server machine, it is good practice for each user to work with their own `tmp`, `sources` and `data` folders. This can be done by adding a `client` node in the server configuration file.

```
<?xml version="1.0" encoding="utf-8" standalone="yes"?>
<square type="server" version="1.3">
  <paths>
    ...
  </paths>
  <database>
    ...
  </database>
  <configuration>
    ...
  </configuration>
  <addons>
    ...
  </addons>
  <client>
    <!-- java system properties are supported under the client node only -->
    <tmp directory="${java.io.tmpdir}/square-${user.name}" />
    <projects directory="${user.home}/.squore/projects" />
  </client>
  <tmp directory="..." />
  <projects directory="..." />
  <workspace directory="..." />
</square>
```

As stated in the example, java system properties are supported in this section of `<SQUORE_HOME>/config.xml`.

Tip

All three elements are optional, and their default value if missing are the ones described in the XML snippet above.

5.3. Backup Tools

Your installation of Squore includes some scripts designed to help save and restore snapshots of your analysis data. These scripts will allow you to:

- Backup the current Squore data (See Section 5.3.1, “Backing-Up the Squore Data”)
- Restore a previously saved snapshot (See Section 5.3.2, “Restoring Squore Data”)

The scripts are located in the `<SQUORE_HOME>/bin` folder of the Squore installation directory.

The Windows and Linux backup scripts accept a parameter that is used as the path to store the backup file. This makes it possible to use a scheduled task on Windows or a cron job on Linux to automate your backups. If you do not specify this parameter, the default backup folder will be used and each new backup will replace the previous one.

Warning

- Before launching a backup or restore operation, stop Squore Server completely and ensure that the Squore Database is started.
- Backups can be launched while the server is running, but it is recommended to regularly perform a backup while the server is stopped. This guarantees that the database and the data files are in sync, which may not be the case if your server is started and analyses are running.
- If your database is not running on the same machine as Squore Server, the backup will only include the Squore Server data files. When running in this configuration, you need to perform database backup and restore operations manually. In this mode, it is necessary to perform both backups at the same time so that the files data matches the database data.

5.3.1. Backing-Up the Squore Data

The contents of the Squore Database and file system can be saved using the `backup` script from the `<SQUORE_HOME>/bin` folder.

In order to create a backup, run the backup script for your system, followed optionally by the path where the backup should be created.

- `<SQUORE_HOME>/bin\backup.bat [%BACKUP_FOLDER%]` on Windows
- `<SQUORE_HOME>/bin/backup [$BACKUP_FOLDER]` on Linux

Tip

If you do not pass a **BACKUP_FOLDER** in your command, the `backup` location specified in `<SQUORE_HOME>/config.xml` will be used.

Executing this script creates a folder with a compressed database dump and a a backup of the projects and workspace folders. This backup can later be used by a script that restores database and file system snapshots, which we will cover in the next section.

5.3.2. Restoring Squore Data

A previously backed-up Squore snapshot can be restored using the `restore` script from the `<SQUORE_HOME>/bin` folder.

In order to restore a backup, run the restore script for your system, followed optionally by the path where the backup to restore is located.

- `<SQUORE_HOME>/bin\restore.bat [%BACKUP_FOLDER%]` on Windows
- `<SQUORE_HOME>/bin/restore [$BACKUP_FOLDER]` on Linux

Tip

If you do not pass a **BACKUP_FOLDER** in your command, data is restored from the `backup` location specified in `<SQUORE_HOME>/config.xml`

The script will clear your current database, projects and workspace folders and replace them with the contents of the backed up data.

5.3.3. Resetting the Squore Installation

You can reset the Squore installation to its initial state using the `squadm` utility from the command line. The tool is located in the `<SQUORE_HOME>/bin` folder of the Squore installation directory.

Warning

This operation cannot be undone. All the projects, roles, users, groups and profiles you created will be lost.

1. Stop Squore Server
2. Ensure that the Squore Database is started
3. From a terminal, launch the following command:

```
squadm reset
```

4. Confirm, and allow the command to finish
5. Start Squore Server

Tip

More information about `squadm reset` can be found in `squadm reset(1)`.

5.4. Advanced PhantomJS Settings

In order to handle cases where the URL configured in **Administration > System** is not accessible to PhantomJS, you can configure a different URL for the communication between Squore and PhantomJS. This is useful when you need to bypass a proxy on your network, or when the Squore Server URL just cannot be resolved from the machine it runs on itself. In those cases, you can force PhantomJS to make requests to Squore Server by adding the `squore-url` attribute to your `<SQUORE_HOME>/config.xml`, as shown below:

```
<phantomjs>  
<socket-binding port="3003" squore-url="http://127.0.0.1:8180/SQuORE_Server/" />  
</phantomjs>
```

When using Microsoft Edge, extra configuration is needed in order to use the **Save as ...** menu items in the chart viewer. In this specific case, PhantomJS must be reachable on your network so that the end user's browser calls it directly to generate a downloadable chart on the fly. The PhantomJS URL needs to be specified in the `distant-url` attribute:

```
<phantomjs>  
<socket-binding port="3003" distant-url="http://servername:3003" />  
</phantomjs>
```

5.5. Creating a Linux Service

This section describes how you can create a service to start and stop Squore using the launcher script from the installation's `bin` folder.

Note

The examples below assume that:

- Your Squore installation is located in `/opt/Squoring/squore-server`
- You have created a user called **squore** to run the service, which is optional

After creating a service, you can configure it to launch Squore at boot, or you can start and stop Squore on your system by running the following commands:

```
sudo service squore start
sudo service squore stop
```

5.5.1. CentOS 6.6, OpenSUSE 13.2

1. Create a Squore service description file in `/etc/init.d/squore`

```
#!/bin/sh
#
# Squore Server Service
#
# chkconfig: 2345 20 80
# description: Squore launcher

### BEGIN INIT INFO
# Provides: squore-server
# Required-Start:
# Required-Stop:
# Should-Start:
# Should-Stop:
# Default-Start:
# Default-Stop:
# Short-Description:
# Description:
### END INIT INFO

# Source function library
. /etc/rc.d/init.d/functions

exec="/opt/Squoring/squore-server/bin/sqctl"
user="squore"
prog="squore"
config=""

[ -e /etc/sysconfig/$prog ] && . /etc/sysconfig/$prog

lockfile=/var/lock/subsys/$prog

start() {
    #[ -x $exec ] || exit 5
    #[ -f $config ] || exit 6
    echo -n "Starting $prog: "
    # if not running, start it up here, usually something like "daemon $exec"
    su $user -c "$exec start"
    #retval=$?
    #echo
    #[ $retval -eq 0 ] && touch $lockfile
    #return $retval
}

stop() {
    echo -n "Stopping $prog: "
    # stop it here, often "killproc $prog"
    su $user -c "$exec stop"
    #retval=$?
    #echo
    #[ $retval -eq 0 ] && rm -f $lockfile
    #return $retval
}
```

```
restart() {
    su $user -c "$exec restart"
}

reload() {
    restart
}

force_reload() {
    restart
}

rh_status() {
    su $user -c "$exec status"
}

case "$1" in
    start)
        $1
        ;;
    stop)
        $1
        ;;
    restart)
        $1
        ;;
    reload)
        $1
        ;;
    force-reload)
        force_reload
        ;;
    status)
        rh_status
        ;;
    condrestart|try-restart)
        restart
        ;;
    *)
        echo $"Usage: $0 {start|stop|status|restart}"
        exit 2
esac
exit $?
```

2. Make the service description file executable

```
chmod a+x /etc/init.d/squore
```

3. Add it to chkconfig

```
chkconfig --add squore
```

4. instruct chkconfig to start the service at boot

```
chkconfig squore on
```

5.5.2. CentOS 7.1

1. Create a Squore service description file in `/etc/systemd/system/squore.service`

```
[Unit]
```

```
Description=Squore Server Service
After=network.target

[Service]
Type=forking
User=squore
ExecStart=/opt/Squoring/squore-server/bin/sqctl start
ExecStop=/opt/Squoring/squore-server/bin/sqctl stop

[Install]
WantedBy=multi-user.target
```

2. Enable the service

```
systemctl enable squore.service
```

5.6. Managing the Squore Windows Service

During the installation of Squore Server on Windows, the installer provides the option to register a service to control Squore's startup and shutdown. This section covers the functionality of the `prunmgr` utility that allows you to further configure some aspects of the Squore Windows service. Note that when you install the Windows service, you should no longer use the start and stop scripts described in Section 4.1, "On Windows"

5.6.1. Windows Service Configuration

After installing Squore Server as a Windows service, you can use the service manager to change some of the settings.

Tip

The Windows service uses Apache Commons Daemon. Consult <https://commons.apache.org/proper/commons-daemon/index.html> for more information about the framework and the available installation options.

Start the utility by typing the following in a command window as administrator:

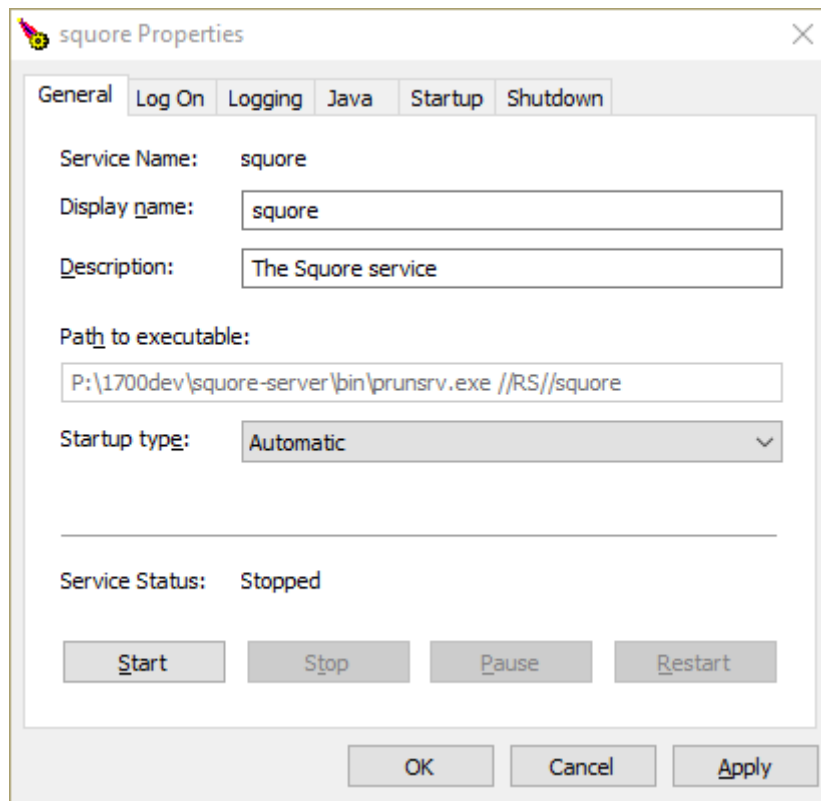
```
<SQUORE_HOME>\bin\prunmgr.exe //ES/squore
```

Tip

`squore` is the service name you chose during the installation.

The service manager opens in a new window and allows you to change the following settings:

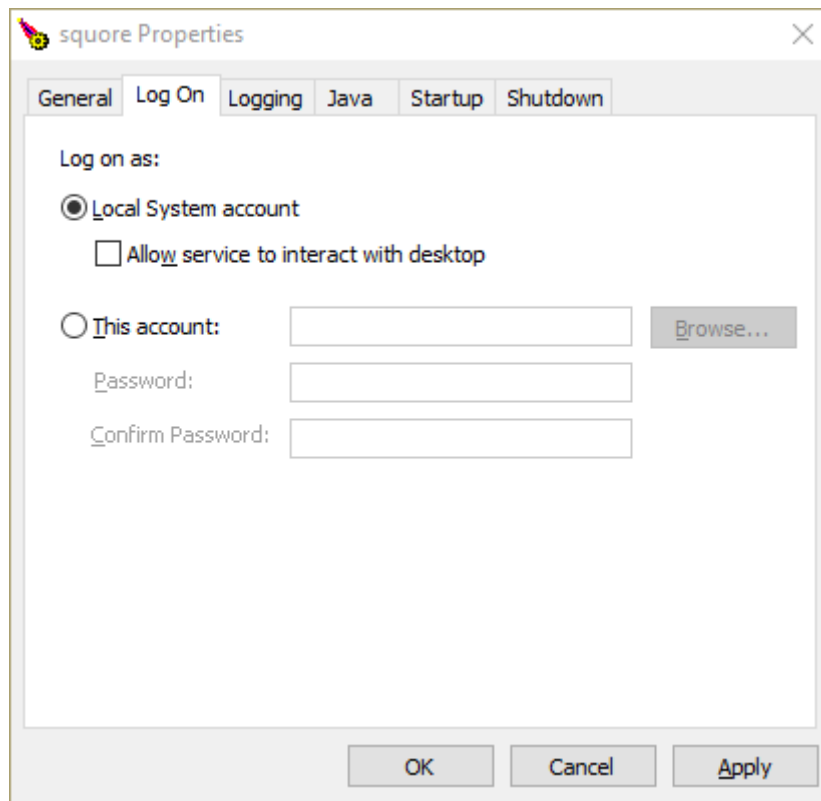
1. **General Settings**



The General Tab

From the General tab, you can adjust the Service display name, description and startup type (Automatic to start at boot, Manual to start interactively, Disabled to stop using the service). You can also see and change the current state of the service.

2. Log On

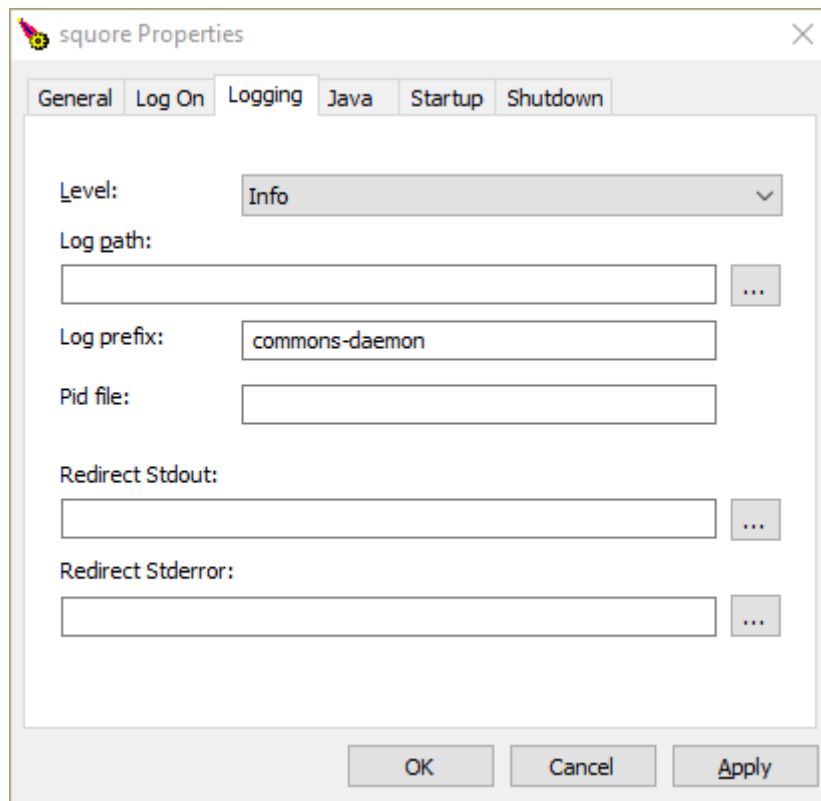


The Log On Tab

From the Log On tab, you can control which Windows account runs the service. Note that any change takes affect after the service is restarted.

The service is set to run under the local system account by default. Depending on your security requirements you may need to manually set the account to a real Windows user to run the services. For more information, consult the Microsoft Windows documentation at <https://technet.microsoft.com/en-us/library/cc755249.aspx>.

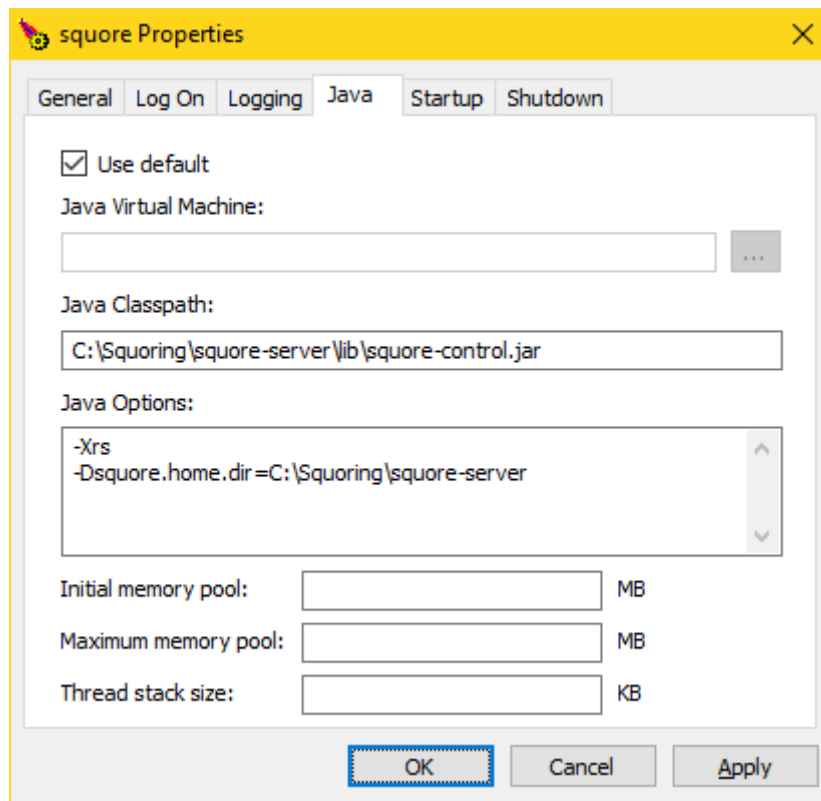
3. Logging



The Logging Tab

On the Logging tab, you can define paths to log files where the startup and shutdown activities of the service will be saved. The default location for the log file is %SystemRoot%\System32\LogFiles\Apache and generally does not need to be changed, unless you are noticing issues starting and stopping the service.

4. Java



The Java Tab

The Java tab is useful if you need to change the path to your JRE. You can use `jvm.dll` from the system's `%PATH%`, or you can point to a specific `%JAVA_HOME%\bin\server\jvm.dll` if needed.

Note

The settings on this tab have no effect over the Java settings for Squore Server. If you want to change the path to the Java installation or the amount of memory used by Squore, refer to Section 5.13, “Changing the path to the Java Installation” and Section 5.12, “Changing the Java Heap Size” instead.

5. Startup and Shutdown

There are no useful settings to be modified on these tabs.

5.7. Managing Project Visibility

Squore users can only have access to a project when they are added to the project's team by the project manager or an administrator. Until this happens, users are unaware of the projects that others have created. In situations where you wish users to be able to see the list of projects that exist on the server, you can configure Squore Server to provide users with a list of projects they do not currently have access to, so that they contact the project owner and ask to be added to the project's team.

As an administrator, your role is to define which projects should appear on this public list. The list includes all project whose group matches the value set up in the administration settings. The procedure below shows how you can automatically list all projects that were created within the `public` group to the public list.

1. Log into Squore as an administrator and click on **Administration > System**

2. Locate the option called **Allow Visibility** and check the box to make projects visible
3. Locate the option called **Pattern to filter list by project group** and set it to `public`
4. Click on **Apply** at the bottom of the page to save your changes

Configuration
Maintenance
Sessions

General

Remote URL to this server

The default mail sender address

Use a remote license server

Timeout of queue tasks, in seconds

Number of concurrent delete tasks

Project Owners List

Allow visibility

Pattern to filter list by project group

LDAP configuration

Default profile for new users

Default group for new users

Theme Control

Allow users to change theme

Default theme

CollabNet TeamForge

TeamForge server URL (without trailing /)

TeamForge server name

TeamForge artifact status on export

TeamForge artifact priority on export

SvnEdge main repository URL

SvnEdge viewer (viewvc) URL

External system id of SvnEdge

Apply
Discard

The Project Owners List options required to list projects from the `public` group

Tip

The **Pattern to filter list by project group** option accepts a regular expression. As a result, you can display projects from any group by setting its value to `.*`, or projects from the `public` and `demo` groups by setting it to `public|demo`. By leaving the field empty, all the existing projects on the server will be visible.

After saving your changes, the **Projects** page will display a new button labelled **Ask access to Project Owners**, as shown below:

<input type="checkbox"/>	Name ↕	Version ↕	Rating	Analysis Model ↕	Colour ↕
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>		<input type="text"/>	

The Projects page with the Ask access to Project Owners button

When clicking the button, you will see the list of projects in the specified groups, together with their owner. Users can click on a user's e-mail address to ask the project owner if they can add them to the project team.

List of Projects Owners			
Project ↕	Group ↕	Owner ↕	Owner Email ↕
rEarth	public	demo	demo@squoring.com

The Projects page with the Ask access to Project Owners button

5.8. Find out your Squore Version

Squore versions use the following naming convention: `major.minor.patch - buildId - scmInfo`. Major and minor releases usually introduce new functionality, while patch releases normally only contain bugfixes.

There are two ways to find out which version of Squore you are running:

- From the web interface via ? > **About**
- From the command line by running

```
sqadm version
```

Tip

More information about `sqadm version` can be found in `sqadm version(1)`.

5.9. Changing Squore Server Port Number

You can change Squore Server port number after installation. The procedure involves modifying some configuration files in a text editor and restarting the server.

1. Shutdown Squore Server
2. Edit `<SQUORE_HOME>/server/standalone/configuration/standalone.xml` and search for the element **socket-binding-group**. The attribute `port-offset="{jboss.socket.binding.port-offset:100}"` defines the offset chosen at installation. Modify the value as needed.
3. Start Squore Server.

5.10. Changing Squore Database Port Number

You can change the port used by the Squore Database by editing PostgreSQL's configuration file and modifying Squore Server's `<SQUORE_HOME>/server/standalone/configuration/standalone.xml` to point to the new port. The procedure involves modifying some configuration files in a text editor and restarting the server.

1. Shutdown Squore Server and stop the database
2. Open `<CLUSTER_DIR>/postgresql.conf` in a text editor and search for the line where the port option is defined:

```
port = 4561 # (change requires restart)
```

3. Change the port value to the desired one for your system
4. Open `<SQUORE_HOME>/server/standalone/configuration/standalone.xml` in a text editor and search for the database connection URL:

```
<connection-url>jdbc:postgresql://localhost:4561/squore</connection-url>
```

5. Change the port value to match the change you made in `<CLUSTER_DIR>/postgresql.conf`.
6. Start Squore Server.

Tip

If you do not know where `<CLUSTER_DIR>` is located on your server, you can find its location by reading the value of the `cluster` setting in `<SQUORE_HOME>/config.xml`.

5.11. Changing the PhantomJS port

The port used by PhantomJS can be changed by editing `<SQUORE_HOME>/config.xml` to change the port value in the following line:

```
<phantomjs>  
<socket-binding port="3003"/>  
</phantomjs>
```

Note

After changing the port, restart Squore Server for the changes to take effect.

5.12. Changing the Java Heap Size

The maximum amount of memory used by Squore Server's Java process at runtime is defined at installation time. If you have not specified any value, the maximum amount of memory used will be 25% of the RAM available on the machine. It is recommended to keep the memory allocated to Squore under 25% of the total

physical RAM so that other Squore modules (especially the database) or external processes (the OS and some Data Providers like Checkstyle or FindBugs) still have enough resources available.

This setting can be changed by following this procedure:

1. Stop Squore Server
2. Edit `<SQUORE_HOME>/server/bin/standalone.conf` on Linux or `<SQUORE_HOME>/server/bin/standalone.conf.bat` on Windows
3. Change the value of the **Xmx** parameter, as shown below:

```
JAVA_OPTS="$JAVA_OPTS -Xms64m -Xmx1512m
```

or

```
set "JAVA_OPTS=%JAVA_OPTS% -Xms64M -Xmx1512M -XX:MaxPermSize=256M"
```

Note

In the example above, **1512M** is the default value for a machine with 6Gb RAM, i.e. 25% of 6048Mb.

4. Start Squore Server

5.13. Changing the path to the Java Installation

The path to the Java installation on your server can be updated by following the procedure below:

1. Stop Squore Server
2. Edit `<SQUORE_HOME>/server/bin/standalone.conf` on Linux or `<SQUORE_HOME>/server/bin/standalone.conf.bat` on Windows
3. Change the value of the **JAVA_HOME**, as shown below:

```
JAVA_HOME="/opt/java/jre8"
```

or

```
set "JAVA_HOME=C:\jre8"
```

4. Start Squore Server

5.14. Configuring Timeouts

You can change the main timeout value for tasks on a Squore Server installation. . The default value is six hours and is generally fine: if an analysis runs for six hours, it is assumed that something went wrong or will go wrong for reasons regarding memory consumption.

If you decide that the timeout does not suit your workflow, you can change the default timeout value from the Administration pages:

1. Log into Squore Server as a user with administrative privileges.
2. Click **Administration > System** to view the advanced configuration options.
3. Set the value of the timeout in seconds in the **Timeout of queue tasks, in seconds** field.

Note

The timeout period defines how long a project can stay in the project queue on the server. This means the timeout period for projects created using the web interface or from the command line using the

DELEGATE_CREATION command is as defined by the parameter above. For projects created from the command line using the PROCESS_CREATION command, the part of the analysis carried out on the client machine is not taken into account in the timeout time. These projects only enter the server queue when the analysis is finished on the client and the results are sent to the server for processing, and there is no built-in timeout for the client part of the analysis.

5.15. Number of Concurrent Analyses

You can change the size of the project queue on a Squore Server installation. The default value is 8, which means that 8 projects can be analysed in parallel.

If your hardware can handle a higher number of concurrent analyses, you can increase the queue size by editing the file `<SQUORE_HOME>/Server/server/default/deploy/square-server.ear/square-server.jar/META-INF/ejb-jar.xml`, and set the **maxSession** key to the desired size. This involves repackaging and redeploying the application, as explained below:

1. Extract the settings file:

```
cd <SQUORE_HOME>/deploy
jar xf square-server.ear
jar xf square-ejb.jar
```

2. Make the necessary modifications:

- Open `<SQUORE_HOME>/deploy/square-ejb.jar/META-INF/ejb-jar.xml` in a text editor
- Modify the parameter **maxSession** (default: 8) to set it to the number of projects that can be created in parallel

3. Repackage the application:

```
cd <SQUORE_HOME>/deploy
jar cf square-ejb.jar
jar cf square-server.ear
```

4. Deploy the patched application following the instructions on https://openwiki.squoring.com/index.php/Deploying_A_Patch#Since_Squore_16.1.2.

Tip

Instead of using the command line, you can use 7zip on Windows to open the .ear and .jar files and directly patch their contents.

5.16. Number of Concurrent Delete Tasks

You can change the number of delete tasks running concurrently by changing the setting on **Administration > System**. This is useful on systems where you run into errors when deleting multiple versions and projects at the same time causes errors.

Configuration
Maintenance
Sessions

General

Remote URL to this server

The default mail sender address

Use a remote license server

Timeout of queue tasks, in seconds

Number of concurrent delete tasks

Project Owners List

Allow visibility

Pattern to filter list by project group

LDAP configuration

Default profile for new users

Default group for new users

Theme Control

Allow users to change theme

Default theme

CollabNet TeamForge

TeamForge server URL (without trailing /)

TeamForge server name

TeamForge artifact status on export

TeamForge artifact priority on export

SvnEdge main repository URL

SvnEdge viewer (viewvc) URL

External system id of SvnEdge

Apply
Discard

Leaving the field empty uses the slots available as defined in Section 5.15, “Number of Concurrent Analyses” to launch several deletions in parallel. If you encounter errors when deleting projects, notably ORA-00060 errors when using an Oracle database, setting the parameter to 1 helps reducing the occurrences of these errors.

5.17. Theme Control

Squore's web interface allows users to choose between several UI themes: chocolate (brown), classico (green), neroverdi (light green), rossoneri (red). When a user selects a theme, their preference is saved and this theme is applied each time they log into Squore. As an administrator, you can manage theme functionality in two ways:

- Define what the default theme for all users is
- Prevent users from using a theme other than the default one

You can access these options from **Administration > System** in the **Theme Control** section.

Tip

You can also configure these settings by specifying values for the options **ui.theme.default** and **ui.theme.changeable** in `<SQUORE_HOME>/server/standalone/configuration/squore-server.properties`. The default values are shown below:

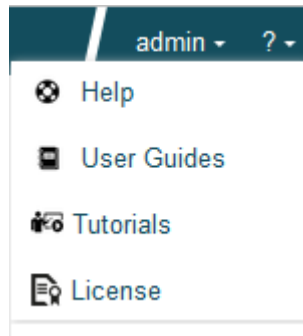
```
ui.theme.default = classico
ui.theme.changeable = true
```

5.18. Updating the Squore Licence File

A Squore licence key file named `squore-license.p7s` should have been provided to you by Squoring Technologies under the applicable Squore licencing agreement.

Follow these steps to deploy the Squore licence file:

1. Log into Squore Server as an administrator
2. Click on **? > License**



3. On the License Management page, click Deploy a license file

License Management
Request a Squore license

- Request a free trial license
- Activate product
- Deploy a license file

4. Upload your new licence file and click Deploy. If the new licence file is valid, you are automatically redirected to the home page.

Deploy a license file

✖ Clear files	
square-license.p7s Uploaded	Clear file
<input type="button" value="Deploy"/>	

Tip

You can access the License Management without logging in if you are accessing `http://localhost:8180/SQUORE_Server` from the machine running Squore Server itself.

5.19. Connecting to a Remote Licence Server

In this section, you will learn to configure Squore to rely on a remote licence server instead of using the licence server embedded into your local installation. This is useful when you run a production server and a development server, and you want the licence to be shared between both installations.

Note

Before you follow these steps, ensure that the two Squore servers are installed and start up correctly as described in Chapter 3, *Installing Squore Server* and Chapter 4, *Starting and Stopping Squore* and that the remote licence server listens to requests from remote machines:

```
<interface name="public">
  <inet-address value="{jboss.bind.address:0.0.0.0}"/>
</interface>
```

Tip

If both servers are running on the same machine, then each server must be identified as a specific instance for this configuration to work. You can achieve this by editing the `server` element at the root of `<SQUORE_HOME>/server/standalone/configuration/standalone.xml` and adding a `name` attribute as shown below:

```
<?xml version='1.0' encoding='UTF-8'?>
<server name="production" xmlns="urn:jboss:domain:4.2">
...
</server>
```

Assign a different name for each server installation before you start following the procedure below.

Warning

This procedure involves modifying `<SQUORE_HOME>/server/standalone/configuration/standalone.xml` and removing one of the default applications deployed automatically by the installation or upgrade script. These changes therefore have to be applied again after upgrading Squore.

In order to point a local Squore server to a licence served by a remote Squore installation, carry out the following steps:

1. On the remote license server (optional):
By default, the password of the `ejb` user is `changeme`. If you want to change the password, then:

- a. Generate a new password with this command:

```
echo -n "ejb:ApplicationRealm:new_password" | md5sum
```

where **new_password** is the password to assign to the user.

- b. Edit `<SQUORE_HOME>/server/standalone/configuration/application-users.properties` to specify the new password as shown below:

```
#
# Properties declaration of users for the realm 'ApplicationRealm' which
# is the default realm
# for application services on a new AS 7.1 installation.
# (...)
ejb=bc0deae7c29cd133a2de015f36ab6132
```

- c. Restart Squore Server.

2. On the local server:

- a. Stop Squore Server.

- b. Edit `<SQUORE_HOME>/server/standalone/configuration/squore-server.properties`. Add the property:

```
license.remote = true
```

- c. Edit `<SQUORE_HOME>/server/standalone/configuration/standalone.xml`

- d. Find the `remote-ejb outbound-socket-binding` element and edit its `remote-destination` definition accordingly so that the `host` and `port` match the `hostname` and `http` port of the remote server (8080 plus the offset you defined during installation, so 8180 by default). Here is an example of the complete configuration block:

```
<outbound-socket-binding name="remote-ejb">
  <remote-destination host="remoteLicenceServer" port="8180"/>
</outbound-socket-binding>
```

- e. Optionally, if you have changed the default password for the `ejb` user on the remote server, look for the `ejb-security-realm security-realm` element, and modify the `secret` value with the output of the command

```
echo -n "new_password" | openssl base64
```

. Here is an example of the complete block:

```
<security-realm name="ejb-security-realm">
  <server-identities>
    <secret value="bmV3X3Bhc3N3b3Jk"/>
  </server-identities>
</security-realm>
```

- f. Restart Squore Server
- g. Run the following command, with `port` matching the controller port of the installation (9990 plus the offset defined at install time, so 10090 by default):

```
<SQUORE_HOME>/server/bin/jboss-cli.sh -c \
--controller=localhost:10090 \
--command="undeploy squore-license.ear"
```

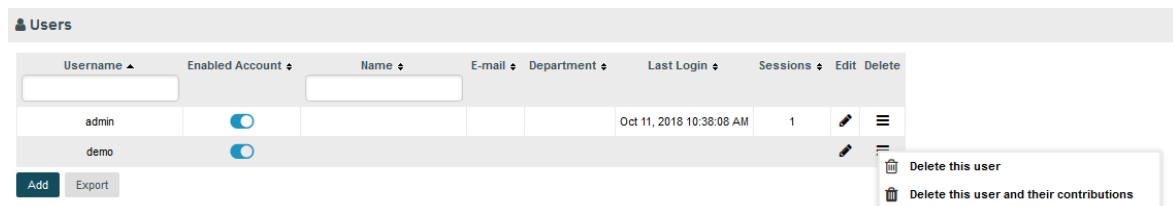
The local Squore Server is now using a remote licence server.

5.20. Managing Squore User Accounts

5.20.1. Blocking and Deleting Accounts

This section covers the three ways to remove unwanted user accounts in Squore: blocking, deleting and purging.

All options can be accessed from **Administration > Users**, where all user accounts are presented in table form.



Username	Enabled Account	Name	E-mail	Department	Last Login	Sessions	Edit	Delete
admin	<input checked="" type="checkbox"/>				Oct 11, 2018 10:38:08 AM	1		
demo	<input checked="" type="checkbox"/>							

The Administration > Users page

When you block an account:

- The user cannot access Squore anymore to view or create projects
- The user's data and contributions are left untouched and are still visible to other users in the web UI.
- You can unblock the account at any time to allow the user to log in again.
- A licence token is freed up when the account becomes inactive (usually 6 months after the last recorded activity of the user).

When you delete an account:

- The user cannot access Squore anymore to view or create projects
- This action is irreversible.
- Personal user data, like favourites, links, API tokens will be removed.

- User contributions, like comments, created projects, state changes will be assigned to a system "Ghost" user, in order to maintain system integrity.
- A licence token is freed up for another user immediately.

When you purge an account:

- The user cannot access Squore anymore to view or create projects
- This action is irreversible.
- All of the user's personal data and contributions are removed.
- All of the user's personal projects (i.e. not visible to other users) are removed.
- A licence token is freed up for another user immediately.

Tip

Blocking and unblocking can be achieved from the **Enabled Account** column of the Users table.

Deleting options are accessible via a menu in the **Delete** column of the Users table.

5.20.2. Automating User Management Tasks

Squore lets you manage users, groups and project teams via a REST API (new in 18.0). The same permissions apply as when using the web interface:

- User management tasks require a profile with the **Manage Groups, User and Roles** privilege
- Project management tasks can only be performed on projects you are allowed to view and manage

Note

The user management functions of the `sqexport.pl` and `sqimport.pl` have been discontinued.

By building your own scripts that use the user management API, you can automate account creation and permission assignment in Squore, as well as manage the visibility of projects for particular users and groups.

API requests need to use an API token, which each user can create from their own **Account Settings** page, as shown below:

Account Settings

My Account

Username *	<input type="text" value="demo"/>
Name	<input type="text"/>
Department	<input type="text"/>
E-mail	<input type="text"/>
Time Zone	<input type="text" value="Europe/Paris"/>
New Password	<input type="text"/>
Confirm New Password	<input type="text"/>

Home Page

Number of projects in history	<input type="text" value="A number.."/>
-------------------------------	---

Display options

Display ID in Measures and Indicators tab

Restore Default Parameters

Restore UI Parameters

Confirm

Cancel

API Tokens

Token Name:

Add

Token Name	Date Created	Last Used	Revoke
------------	--------------	-----------	--------

To create an API token, set a label and click **Add**. The token is generated and added to the list of API tokens for the user. The table shows when each token was created and last used. Clicking **Revoke** cancels the API token and prevents it from being used again.

API Tokens

Token Name:

Add

The token will be only displayed once.

eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJ1aWQiOiJ1b3R5ODQwNDUzNTEzNn0=.UbehL0IK5CmozXML-jhXygQnQrg28fb2l0wEIdnEBDc=

Token Name	Date Created	Last Used	Revoke
demo-token	Jun 7, 2018 10:48:55 PM		Revoke

Note

The token is only displayed once to the user, when it is created. If users lose their token, there is no way to find it again. The old token should be revoked and a new should be created.

When calling the API, the token must be passed in the Authorization header. Here is an example command line that retrieves the list of users on the server with the token created earlier:

```
curl -H "Authorization: Bearer
eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJ1aWQiOiJ1b3R5ODQwNDUzNTEzNn0=.UbehL0IK5CmozXML-jhXygQnQrg28fb2l0wEIdnEBDc=" http://localhost:8180/SQuORE_Server/api/users
```

Tip

The base URL for the API is http://localhost:8180/SQuORE_Server/api. You can access the full API documentation online at <https://support.squoring.com/documentation/api/v1/>.

5.21. Setting Perl Environment

This section is useful if you want to manually execute Perl scripts that are usually internally used by Squore.

5.21.1. Windows

If you have installed the Portable Strawberry Perl with Squore, locate and execute this file (skip this step otherwise):

```
<SQUORE_HOME>\Tools\perl\portableshell.bat
```

Then type all commands in the new command prompt window.

```
SET SQUORE_HOME=<SQUORE_HOME>
SET PERL5LIB=%SQUORE_HOME%\share\perl
```

5.21.2. Linux

```
SQUORE_HOME=<SQUORE_HOME>
export SQUORE_HOME
PERL5LIB=$SQUORE_HOME/share/perl
export PERL5LIB
```

5.22. Usage Statistics

As a Squore administrator, you may need to keep track of the usage of the platform and report on its overall performance. This information is now available directly within Squore via **Administration > Statistics**. If you

are also a model developer or a project manager and wish to fine-tune the layout of your dashboards, you will find more statistical data about how users consult analysis results via **Models > Statistics** and the **Manage Project** page. This section describes the information you can access from these pages. Note that statistics are collected locally, saved in the Squore database, and never sent anywhere. Statistics collection cannot be turned off. Viewing the statistics collected on the server is subject to licence.

Tip

Before you can view statistics on these pages, a date range must be selected in order to display information about the activity on the server during this period. You can also select whether the information is aggregated by day, week, month or year by adjusting the granularity setting.

Statistics

Reporting Period: -

Granularity: Day Week Month Year

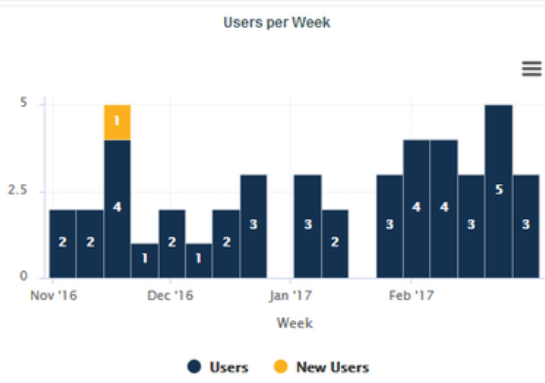
5.22.1. Application Usage Statistics for Administrators

The application usage statistics are broken down into five sections where you can view information about users, projects, hardware resources, pages response time and dashboard usage.

Users

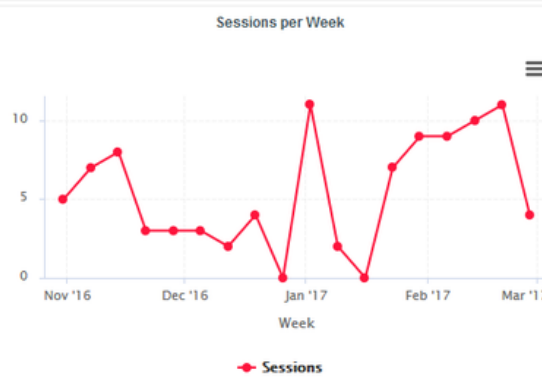
Total Users: 43
Online Users: 1
Web Users during this period: 43

Users per Week



Username	Sessions	Pages Viewed	%	Average Session Duration
jmeter1	40	11347	88.69%	00:38:55
jmeter2	25	495	3.87%	01:58:06
jmeter3	6	467	3.65%	02:37:39
jmeter4	7	208	1.63%	02:18:53
jmeter5	12	179	1.4%	00:13:17
jmeter6	3	42	0.33%	00:04:36

Sessions per Week



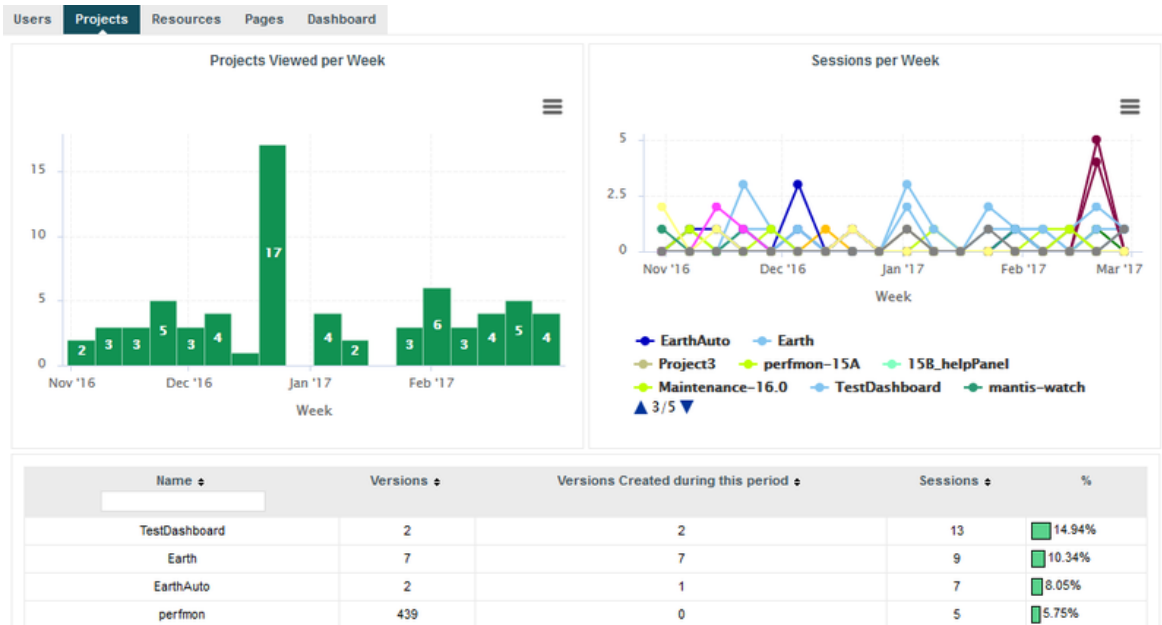
Session Duration	Sessions	%
< 1 minute	33	33.67%
1 to 5 minutes	23	23.47%
5 to 10 minutes	2	2.04%
10 to 20 minutes	3	3.06%
20 to 30 minutes	2	2.04%
30 to 40 minutes	3	3.06%
> 40 minutes	32	32.65%
All	98	

The Users tab displays the following information:

- Global statistics about user accounts for this Squore Server installation
- Information about current Web Users Web Users during the selected period

- A series of charts containing information about the number of users, new users and overall connections to the server during the selected period
- A table detailing session information per user
- A table displaying session duration statistics

Projects

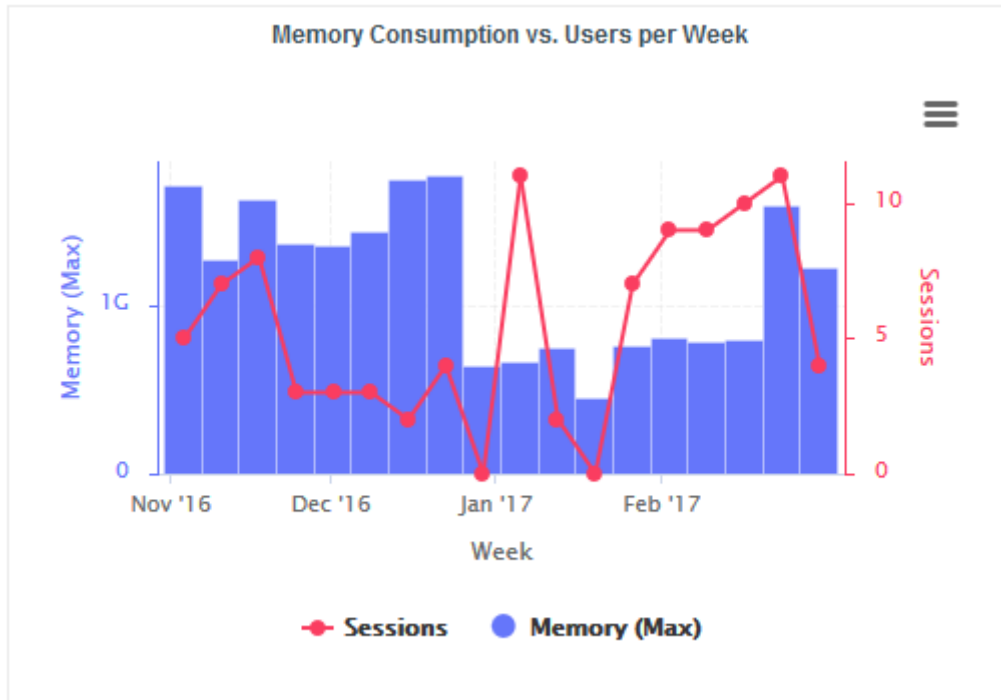


The Projects tab displays information about the number of projects viewed. You can get overall numbers of visits for all the projects on the server, or select specific projects to compare their number of views. The data is rendered as:

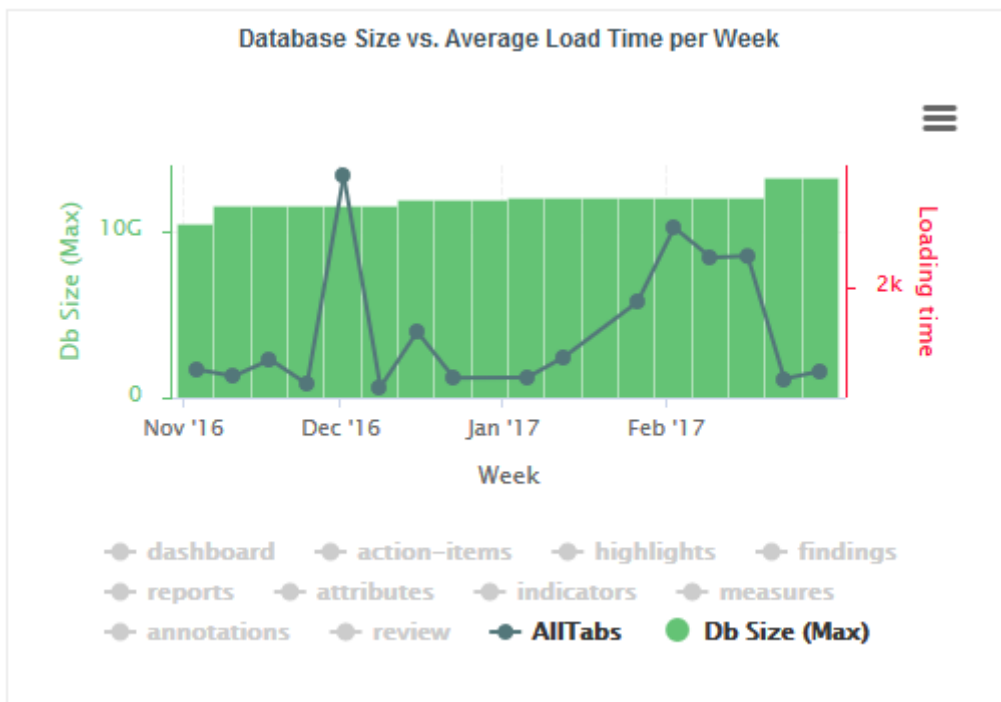
- A chart showing a trend of the total number of projects viewed for the selected reporting period
- A chart where you can consult detailed view statistics about the projects of your choice. You can click on a project name to show or hide it from the chart.
- Information about the number of sessions per project during the selected period

Resources

The Resources tab helps administrators in monitoring the memory and disk consumption and the performance of the application.

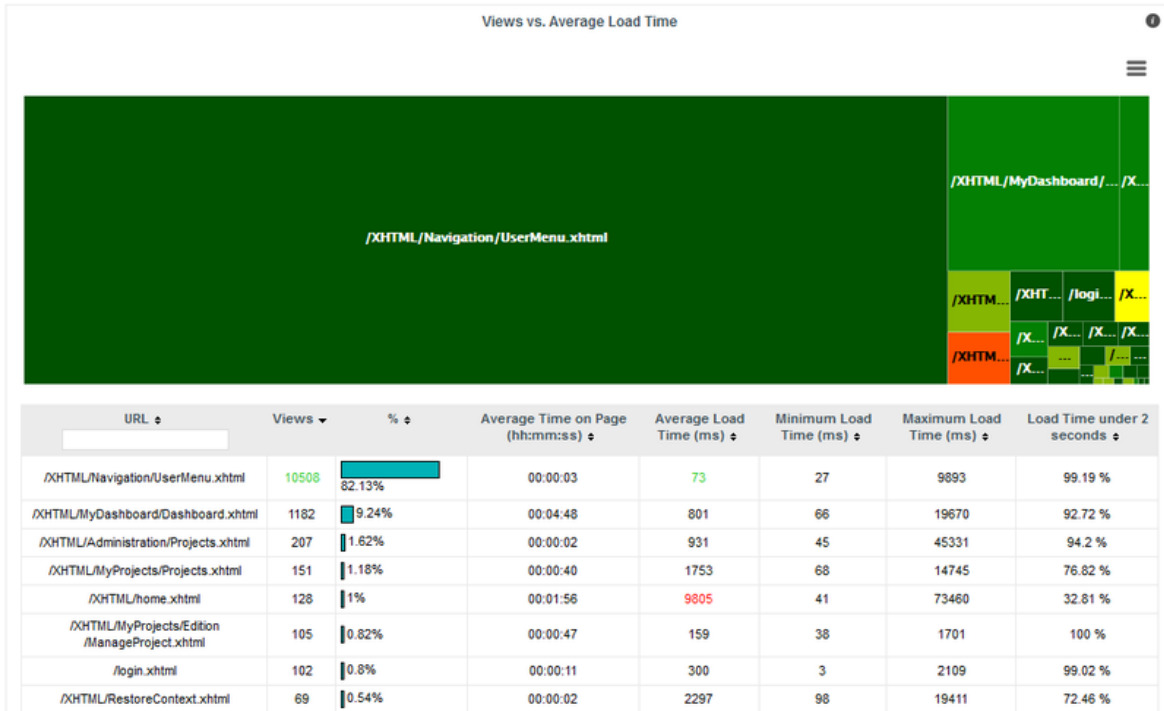


Memory Consumption vs. Users: displays a history of the amount of memory used by the java process running the application and a line indicating the number of users who logged in during the selected period.



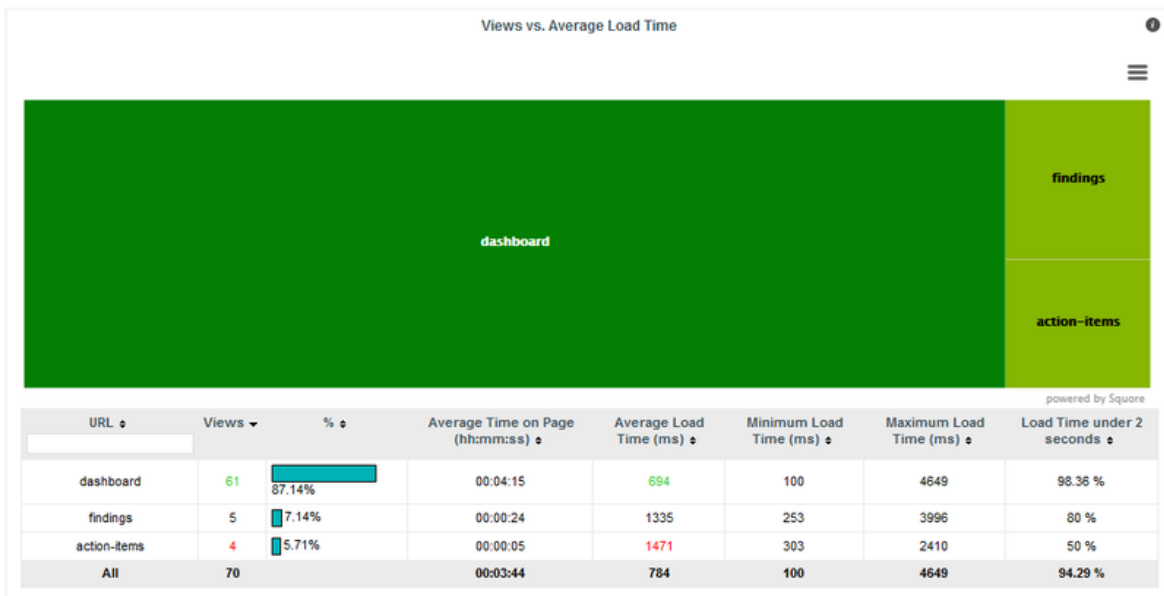
Database Size vs Average Load Time: displays a history of the size of the database on disk. Trend lines displaying the average page or tab load times can be displayed on the chart.

Pages



The Pages tab, shows statistics about page views and load times in tabular form and graphical form. The table automatically highlights the best result in green and the worst result in red.

Dashboard



The Dashboard tab allows analysing the usage of each tab on the dashboard. Each tab is represented in a treemap according to how many views it receives. This information can be used to adjust the default display status of each tab or their availability to end users.

5.22.2. Statistics for Model Developers

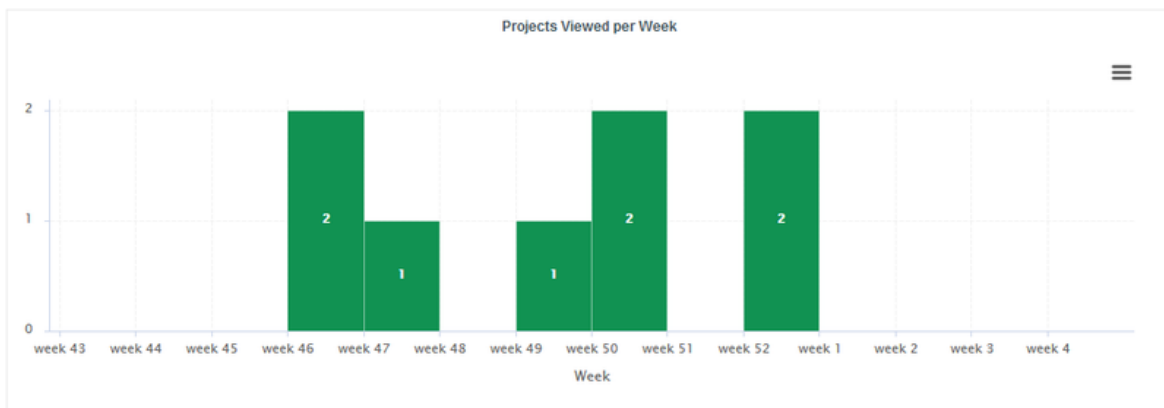
You can learn more about the usage of particular features of a model by clicking **Models > Statistics**. For each analysis model, find out how many users consult results, which projects are the most popular and which regions and charts of the dashboard are the most useful for users.

Users



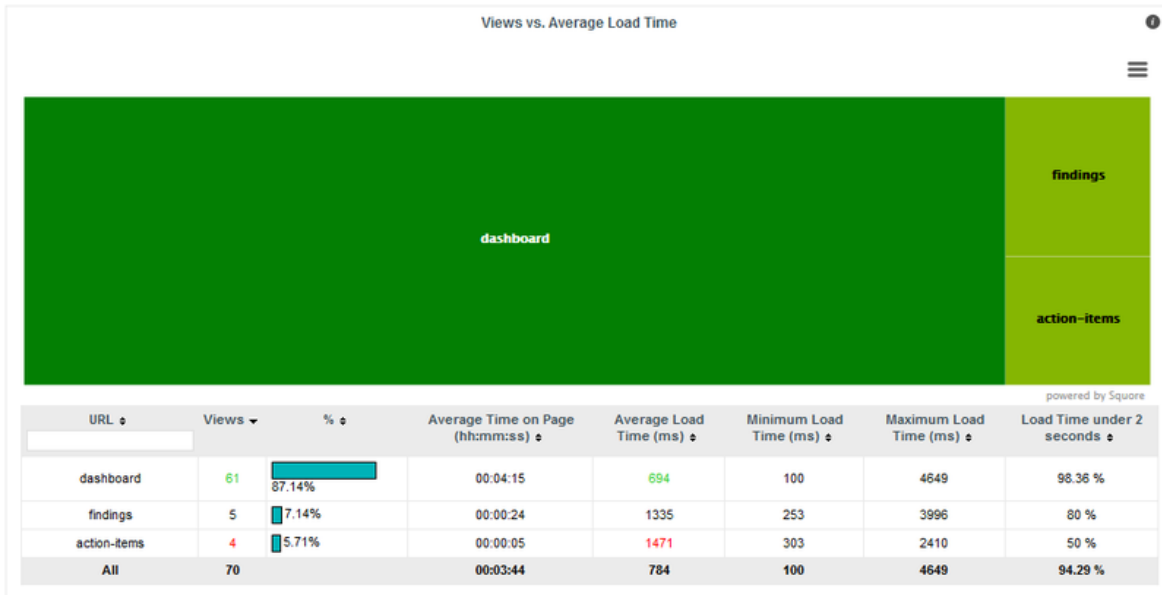
The Users tab displays the information about the number of users and overall connections to the server for projects in this analysis model.

Projects



On the Projects tab, you can check how many projects had visitors over the selected period.

Dashboard



The Dashboard tab allows analysing the usage of each tab on the dashboard. Each tab is represented in a treemap according to how many views it receives. This information can be used to adjust the default display status of each tab or their availability to end users.

Charts

Application ▼

Chart Usage
i

☰

Technical Debt Trend

ISO25010 Quality Breakd...

RISK_SQALE_PYRAMID

INDICATOR

ISSUE_DISTRIBU...

OBJECTIVE_TEC...

powered by Squore

Charts ▲	Views ⇅	Average Load Time ⇅	Comments ⇅
Analytics KPI breakdown	0	9 ms	0
Code Cloning Trends	0	63 ms	0
Code Stability Trend	0	31 ms	0
Code Status Distribution	0	3 ms	0
Coverage Compliance Distribution	0	49 ms	0
Critical Factor Distribution	0	14 ms	0
Function Coverage Map	0	84 ms	0
INDICATOR	1	12 ms	0
ISO25010 Quality Breakdown	2	5 ms	0
ISSUE_DISTRIBUTION	1	24 ms	0
Langage Distribution	0	28 ms	0
OBJECTIVE_ISSUE_BLOCKER	0	7 ms	0
OBJECTIVE_ISSUE_CRITICAL	0	8 ms	0
OBJECTIVE_ISSUE_MAJOR	0	6 ms	0
OBJECTIVE_ROKR_SUBSET	0	16 ms	0
OBJECTIVE_SDESCR	0	6 ms	0
OBJECTIVE_TECH_DEBT	1	10 ms	0
Objectives Trends	0	17 ms	0
RISK_SQALE_PYRAMID	2	6 ms	0
Technical Debt Trend	6	19 ms	1
Test Gap Analysis (only "To Be Tested" modules)	0	55 ms	0
All	13	14 ms	1

The Charts tab provides information about chart usage in your model: The number of views per chart (per artefact type or for all artefact types), the average loading time and the number of comments.

5.22.3. Statistics for Project Managers

As a project manager, you can use project statistics to investigate the popularity of your project by going to **Manage > Statistics**.



When you select a reporting period, the following information is displayed:

- The trend of the number of views for this project uses the colours from the scale of the root indicator as background to help you correlate the project rating with the number of visits.
- The treemap helps you understand which of the dashboard tabs is the most visited for this project.
- A table summarises the breakdown of views per user, as well as the number of comments left by each user.

6. Integrating Squore on Your Network

6.1. Accessing Squore via HTTPS

You can configure WildFly to allow https access to Squore Server instead of http by following the instructions below.

Note

These instructions are based on the standard WildFly instructions from <https://docs.jboss.org/author/display/WFLY10/Security+Realms#SecurityRealms-DetailedConfiguration> for securing the web server and use a self-signed certificate managed in the Java keystore, which may show a warning in users' browsers.

If your company supply their own certificate and you want to import it instead of generating one, refer to the instructions in Section 6.3, "Key and Certificate Management".

Tip

It is also possible to use Apache as a reverse proxy on top of Squore Server to achieve the same result. For more information, consult Section 6.2, "Proxying Squore Server with Apache".

1. Generate a secret key/certificate and store it in a file called a "key store" (foo.keystore in the current directory). The certificate is valid for 30 years (10950 days). The password use for encryption is "secret". One important issue is the common name (CN) of the certificate. For some reason this is referred to as "first and last name". It should however match the name of the web server, or some browsers like IE will claim the certificate to be invalid although you may have accepted it already.

```
$ keytool -genkey -alias foo -keyalg RSA -keystore foo.keystore -validity
10950
Enter keystore password: secret
Re-enter new password: secret
What is your first and last name?
  [Unknown]:  foo.acme.com
What is the name of your organizational unit?
  [Unknown]:  Foo
What is the name of your organization?
  [Unknown]:  acme corp
What is the name of your City or Locality?
  [Unknown]:  Duckburg
What is the name of your State or Province?
  [Unknown]:  Duckburg
What is the two-letter country code for this unit?
  [Unknown]:  WD
Is CN=foo.acme.com, OU=Foo, O=acme corp, L=Duckburg, ST=Duckburg, C=WD
correct?
  [no]:  yes

Enter key password for <deva> secret
  (RETURN if same as keystore password):
Re-enter new password: secret
```

2. Create a new security realm in WildFly's <SQUORE_HOME>/server/standalone/configuration/standalone.xml to configure an SSL Server identity:

```
<management>
  <security-realms>
```

```
<security-realm name="SslRealm">
  <server-identities>
    <ssl>
      <keystore path="/path/to/foo.keystore" keystore-
password="keystore_password" alias="foo" key-password="key_password" />
    </ssl>
  </server-identities>
</security-realm>
<security-realm name="ManagementRealm">
  ...
</security-realm>
</security-realms>
</management>
```

Note

It is recommended to store configuration files outside of <SQUORE_HOME> to avoid losing them when upgrading your installation.

3. Add a HTTPS listener next to the default HTTP listener in <SQUORE_HOME>/server/standalone/configuration/standalone.xml:

```
<http-listener [...] name="default" socket-binding="http" [...] />
<https-listener name="default-ssl" socket-binding="https" max-post-size="0"
security-realm="SslRealm" />
```

Note

After HTTPS access is configured and working correctly, it is recommended to remove the **http** connector completely.

4. Configure safe session cookies by editing the default `servlet-container`

Warning

Skip this step if your server redirects HTTP to HTTPS.

Add the `secure="true"` to `session-cookie` element:

```
<servlet-container name="default">
  <jsp-config/>
  <session-cookie http-only="true" secure="true"/>
  <websockets/>
</servlet-container>
```

5. Start Squore Server. The SSL port is 8443 + the offset selected at installation. By default you should therefore be able to access the web interface via `https://localhost:8543` in your browser.

If you need to leave the HTTP connector active, you can automatically redirect insecure traffic to HTTPS by modifying <SQUORE_HOME>/server/standalone/configuration/standalone.xml:

1. Find the `host` section of the undertow subsystem and add a `filter-ref` element to match URLs using the server's HTTP port:

```
<host name="default-host" alias="localhost">
  <location name="/" handler="welcome-content"/>
  <filter-ref name="http-to-https" predicate="not(equals(%A,'127.0.0.1')) and
equals(%p,8180)"/>
</host>
```

2. Find the `filters` section of the undertow subsystem and add a `rewrite` element to redirect insecure requests to HTTPS:

```
<filters>
  <response-header name="server-header" header-name="Server" header-
value="WildFly/10"/>
  <response-header name="x-powered-by-header" header-name="X-Powered-By"
header-value="Undertow/1"/>
  <rewrite name="http-to-https" target="https://localhost:8543%U"
redirect="true"/>
</filters>
```

3. Start Squore Server and access `http://localhost:8180` to verify that you are automatically redirected to `https://localhost:8543`.

6.2. Proxying Squore Server with Apache

It is possible to use Apache in a proxy/reverse proxy role on top of Squore Server. This approach makes use of the `proxy` and `proxy_wstunnel` modules to handle web and websocket traffic between client browsers and Squore Server and is compatible with Apache starting from version 2.4.

Note

For more information about the Apache modules, consult http://httpd.apache.org/docs/2.4/mod/mod_proxy.html and http://httpd.apache.org/docs/2.4/mod/mod_proxy_wstunnel.html.

The following configuration can be used to proxy Squore Server traffic in your Apache configuration file:

```
<VirtualHost *:80>
  ServerName  squore.example.com
  ProxyPass  / http://localhost:8180/
  ProxyPassReverse / http://localhost:8180/
  <Location />
    RewriteEngine on
    RewriteCond %{HTTP:UPGRADE} ^WebSocket$ [NC]
    RewriteCond %{HTTP:CONNECTION} Upgrade$ [NC]
    RewriteRule .* ws://localhost:8180%{REQUEST_URI} [P]
  </Location>
</VirtualHost>
```

These lines of configuration are the minimum required to guarantee that the necessary traffic to and from Squore. For more complex scenarios, including SSL and certificate configuration, refer to official Apache documentation on <http://httpd.apache.org/docs/2.4/>.

6.3. Key and Certificate Management

For more details on keys and certificates management with the **keytool** utility, please refer to the `keytool(1)` man page, or online documentation.

The system-wide keystore with CA certificates is a `cacert` file, which is located in the `java.home/lib/security` directory, where `java.home` is the runtime environment's directory.

Note: the default password of the system-wide keystore is *changeit*.

6.3.1. Import a private key and a certificate

The Java **keytool** utility does not support importing a private key directly from a file. First convert the private key into PKCS12 format, then merge that file with the Java keystore:

```
openssl pkcs12 -export -in server.crt -inkey server.key -name company -out file.p12
```

```
keytool -importkeystore -srckeystore file.p12 -destkeystore file.keystore -srcstoretype PKCS12 -destalias company
```

6.3.2. Import a certificate

To import a certificate into a keystore:

```
keytool -importcert -keystore file.keystore -file file.crt -alias company
```

You can now use the keystore and certificate alias to configure HTTPS access to your Squore installation following the instructions in Section 6.1, “Accessing Squore via HTTPS”.

6.4. Using the LDAP Authentication Module

By default, Squore Server uses its own authentication mechanism, storing user information in the Squore database. An existing directory can be used in addition, so that all existing users your the directory can log into Squore without having to create accounts manually, and the user's full name, e-mail address and department can be imported automatically. The process described in this section explains how to configure a Squore administrator, set up the server to authenticate all new users as standard users when they log in via with their LDAP credentials and finally lists the configuration files that need to be modified to turn on LDAP authentication. After you integrate with LDAP, you will still be able to create and use users that are only known to Squore and do not exist in your directory.

Tip

Before you start, ensure that you know:

- The address of the LDAP server you want to connect to Squore.
- The section(s) of the directory that contain the users that should be allowed to log into Squore.
- The login and password of a user account allowed to browse the section(s) of the directory mentioned above.
- Basic knowledge of your directory structure. Note that Squore was tested with Microsoft Active Directory on Windows Server 2008 and OpenLDAP on Ubuntu 12.04.

In order to enable LDAP authentication, follow these steps:

1. Decide which role will be associated to a user the first time they log into Squore. The default choices are:
 - **STANDARD_USER**: Standard users can view projects.
 - **ADVANCED_USER**: Advanced users can projects and create new ones.
 - **ADMINISTRATOR**: Administrators can view projects and administer the server. They cannot create projects.If none of these choices fit your needs, you can create a specific profile later by logging into Squore and going to **Administration > Profiles**. If no profile is specified, then the user will be assigned the **STANDARD_USER** profile by default.
2. Decide which group new users will be part of the first time they log into Squore. The default choices are:

- **users:** Users from this group can view and create projects.
- **admin:** Users from this group can administer Squore and view projects but they cannot create projects.

If none of these choices fit your needs, you can create a specific group later by logging into Squore and going to **Administration > Groups**. If no group is specified, then the user will not be added to any group.

3. Configure WildFly: Edit `<SQUORE_HOME>/server/standalone/configuration/standalone.xml`, and locate the section providing the *squore-policy* security domain, which by default looks like this:

```
<security-domain name="squore-policy" cache-type="default">
  <authentication>
    <login-module code="Database" flag="sufficient">
      (...)
    </login-module>
  </authentication>
</security-domain>
```

4. Paste in the configuration for LDAP or Active Directory before the default login module. Here is a full security-domain with both login modules:

```
<security-domain name="squore-policy" cache-type="default">
  <authentication>
    <!-- LDAP login module -->
    <login-module code="com.squoring.squore.server.security.LdapLoginModule"
      flag="sufficient">
      <module-option name="java.naming.factory.initial"
        value="com.sun.jndi.ldap.LdapCtxFactory"/>
      <module-option name="java.naming.provider.url" value="ldaps://domain-
        controller:636"/>
      <module-option name="java.naming.security.authentication" value="simple"/>
      <module-option name="baseCtxDN" value="ou=people,dc=example,dc=com"/>
      <module-option name="bindDN" value="cn=admin,dc=domain,dc=com"/>
      <module-option name="bindCredential" value="password"/>
      <module-option name="baseFilter" value="(uid={0})"/>

      <module-option name="rolesCtxDN" value="ou=groups,dc=example,dc=com"/>
      <module-option name="roleFilter" value="(member={1})"/>
      <module-option name="roleAttributeIsDN" value="false"/>
      <module-option name="roleAttributeID" value="cn"/>

      <module-option name="userCompositeName" value="cn"/>
      <module-option name="userMail" value="mail"/>
      <module-option name="userOrganizationUnit" value="ou"/>
      <module-option name="userId" value="uid"/>
    </login-module>
    <!-- Active Directory login module -->
    <login-module code="com.squoring.squore.server.security.LdapLoginModule"
      flag="sufficient">
      <module-option name="java.naming.factory.initial"
        value="com.sun.jndi.ldap.LdapCtxFactory"/>
      <module-option name="java.naming.provider.url" value="ldap://domain-
        controller:389"/>
      <module-option name="java.naming.security.authentication" value="simple"/>
      <module-option name="baseCtxDN" value="OU=Users,DC=EXAMPLE,DC=COM"/>
      <module-option name="bindDN"
        value="CN=Administrator,OU=Administrators,DC=EXAMPLE,DC=COM"/>
    </login-module>
  </authentication>
</security-domain>
```

```
<module-option name="bindCredential" value="password"/>
<module-option name="baseFilter" value="(sAMAccountName={0})"/>

<module-option name="rolesCtxDN" value="OU=Users,DC=EXAMPLE,DC=COM"/>
<module-option name="roleFilter" value="(sAMAccountName={0})"/>
<module-option name="roleAttributeIsDN" value="true"/>
<module-option name="roleAttributeID" value="memberOf"/>
<module-option name="roleNameAttributeID" value="CN"/>
<module-option name="searchScope" value="ONELEVEL_SCOPE"/>

<module-option name="userCompositeName" value="sAMAccountName"/>
<module-option name="userMail" value="mail"/>
<module-option name="userOrganizationUnit" value="department"/>
<module-option name="userId" value="sAMAccountName"/>
</login-module>
<login-module code="Database" flag="sufficient">
  (...)
</login-module>
</authentication>
</security-domain>
```

5. Edit the security domain properties to reflect your setup (LDAP or Active Directory). The LDAP administrator shall provide the following information:
 - **java.naming.provider.url**: The URL of the directory server.
 - **baseCtxDN**: The fixed DN of the context to start the user search from.
 - **bindDN**: The DN used to bind against the ldap server for the user and roles queries. This is some DN with read/search permissions on the baseCtxDN and rolesCtxDN values.
 - **bindCredential**: The password for the bindDN
 - **baseFilter**: The search query sent by Squore to the LDAP server when authenticating. If the password is correct and the search returns true, the user is allowed to log into Squore. The default query checks that the login exists, but you can change it to check that the login is valid and that the user is part of a specific group for example, using the syntax `&((condition1) (condition2))`. For more information about LDAP query syntax, refer to [https://technet.microsoft.com/en-us/library/aa996205\(v=exch.65\).aspx](https://technet.microsoft.com/en-us/library/aa996205(v=exch.65).aspx). Note that the **&** characters must be written as an entity (**&**) in the settings file.
 - **rolesCtxDN**: The fixed DN of the context to search for user roles. This is required to exist, even though it is not used by Squore at the moment.
 - **userCompositeName (optional)**: the field in the LDAP account that Squore will import and user as the user's full name.
 - **userMail (optional)**: the field in the LDAP account that Squore will import and user as the user's e-mail address.
 - **userOrganizationUnit (optional)**: the field in the LDAP account that Squore will import and user as the user's department.
 - **userId (optional)**: the field in the LDAP account that Squore will use as a the final user login to create the account or log into the application. When no value is specified for this field, Squore uses the login as typed by the user on the login page.

Note

Using this field helps avoiding confusion with mixed-case logins. Squore Server considers **demo** and **Demo** as two separate users by default. By specifying that the login is taken from a specific field from your directory, you ensure that the same account is used no matter what case was used in the login form.

Note that for Active Directory, *OU*, *DC* and other keywords are all uppercase.

For more details on the WildFly configuration of the LDAP module and the more details about the available options, please refer to <http://community.jboss.org/wiki/LdapExtLoginModule>.

6. Start Squore Server.
7. Log in as administrator and configure the default group and profile information for users who log in for the first time in the LDAP configuration section of **Administration > System**.

Note

Note: It is highly recommended to use LDAPS instead of LDAP. In the `<SQUORE_HOME>/server/standalone/configuration/standalone.xml` configuration file, configure the `java.naming.provider.url` property to use an LDAPS server. The URL of an LDAPS Server will look like the following: `ldaps://host:port/`.

The java instance used by WildFly shall be able to check the certificate of the LDAP server. If the LDAP certificate has not been signed by an "official" CA (self-signed certificate, or the company issued its own root CA), please refer to Section 6.3.2, "Import a certificate".

Tip

User accounts created before you configured the connection to the directory still exist and can still log in.

Tip

If you need to authenticate users on more than one branch in your directory, duplicate the `login-module` block and change the `baseCtxDN` and `rolesCtxDN` accordingly.

Note

The login module used has changed in Squore 2014-A-SP1 to support the import of extra user information, but you can still revert to the legacy authentication module if you are experiencing compatibility issues. To do so, change the login module `code` attribute in `<SQUORE_HOME>/server/standalone/configuration/standalone.xml` from

```
<login-module code="com.squoring.squore.server.security.LdapLoginModule"
  flag="sufficient" >
```

to

```
<login-module code="org.jboss.security.auth.spi.LdapExtLoginModule"
  flag="sufficient" >
```

When using the legacy login module, you should set the following module option if you are using Active Directory:

```
<module-option name="allowEmptyPasswords" value="false" />
```

This option prevents users from authenticating successfully when sending a blank password, as is the case when using some versions of Active Directory.

6.5. Configuring E-Mail Notifications

Squore allows users to configure automatic sending of e-mail notifications at the end of an analysis. In order to use this feature, Squore Server must be configured to communicate with an SMTP server.

Before you start, ensure that the following details are available:

- The URL and port of your SMTP server
- The username and password used to authenticate against the SMTP server
- The e-mail address that you want to see used in the **from** field of the e-mails.

In order to configure the SMTP server integration:

1. Edit `<SQUORE_HOME>/server/standalone/configuration/standalone.xml`, find the `mail-session` configuration, which by default looks like this:

```
<smtp-server outbound-socket-binding-ref="mail-smtp" />
```

2. Complete the element to add in the username and password for the smtp server, and optionally turn on ssl:

```
<mail-session name="default" jndi-name="java:jboss/mail/Default">  
  <smtp-server outbound-socket-binding-ref="mail-smtp" ssl="false"  
    username="login" password="password" />  
</mail-session>
```

3. Find the `outbound-socket-binding` element with the name attribute `mail-smtp` and edit the `remote-destination` sub-element as needed:

```
<outbound-socket-binding name="mail-smtp">  
  <remote-destination host="localhost" port="25" />  
</outbound-socket-binding>
```

4. Start Squore Server.
5. Log in as administrator and go to **Administration > System**.
6. Set the value of the FROM e-mail address for notifications, as well as the Squore Server URL to be used in body of the e-mails, for example `squore@domain.com` and `http://localhost:8180/SQuORE_Server/`.

6.6. Notifying Users by E-Mail

Notification

The E-mail form to notify all users available to administrators.

Squore allows notifying all users by e-mail when planned maintenance is necessary. If you have already configured e-mail notification as explained in Section 6.5, “Configuring E-Mail Notifications”, follow these steps to send a maintenance e-mail:

1. Log in as administrator.
2. Click **Administration > System**
3. Click on Notify users by e-mail.
4. Type a message subject and content and click Send to e-mail users.

The e-mail notification will be sent to all enabled users that have an e-mail address.

Tip

Squore will actually limit the amount of recipients to 100 per e-mail, and send more than one e-mail if necessary. If this number of recipients is too high for your SMTP server, you can configure the maximum number of recipients to include in a single e-mail by setting the **mail.recipients** property in `<SQUORE_HOME>/server/standalone/configuration/squore-server.properties`:

```
mail.recipients = 100
```

6.7. Linking to Projects

There are two ways to build direct links to projects in Squore:

- using IDs with the **RestoreContext** page

→ using names with the **LoadDashboard** page

Each method supports different parameters to build direct links to a tab of the Explorer for the specified project, as explained below.

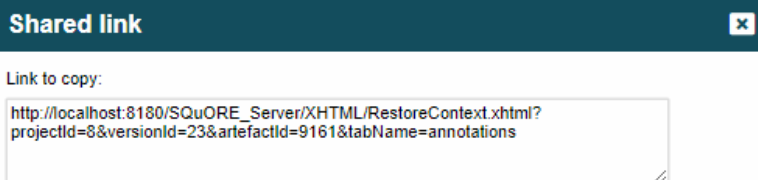
**http://localhost:8180/
SQuORE_Server/
XHTML/
RestoreContext.xhtml**

Links to the Squore Explorer using IDs. The URL accepts the following parameters:

- **modelId** to link to a model node in the portfolio
- **projectId** to link to the latest version of the specified project
- **versionId** to link to a specific version of a project
- **artifactId** to link to a specific artefact in a project (can be combined with projectId and versionId)
- **tabName** to display a specific tab of the Explorer. This parameter can be combined with any of the ones above and must be one of:
 - dashboard (default)
 - action-items
 - highlights
 - findings
 - reports
 - attributes (Forms)
 - indicators
 - measures
 - annotations

Tip

Users can copy a RestoreContext link from the Home page, the Projects page, or generate one using the **Share...** dialog in an artefact's context menu, which is the only way to find an artefactId. Model IDs are not exposed anywhere in the web interface.



The sharing dialog from the web UI with a full RestoreContext URL

Project and version IDs are printed in the project's output XML file, making it easy to parse and build a URL dynamically when using continuous integration to launch analyses.

**http://localhost:8180/
SQuORE_Server/
XHTML/MyDashboard/
dashboard/
LoadDashboard.xhtml**

Links to the Squore Explorer using names instead of IDs. The URL accepts the following parameters:

- **application (mandatory)** to specify the project to link to
- **version (optional)** to specify which version of the project to display. When not specified, the latest version for the project is displayed

- **artefactId (optional)** to link to a specific artefact in the project
- **tabName** to display a specific tab of the Explorer. This parameter can be combined with any of the ones above and must be one of:
 - dashboard (default)
 - action-items
 - highlights
 - findings
 - reports
 - attributes (Forms)
 - indicators
 - measures
 - annotations

Tip

The following is a URL that links to the version called V5 in the project called Earth. Since no artefactId and tabName are specified, the Dashboard tab will be displayed for the root node of the project: http://localhost:8180/SQuORE_Server/XHTML/MyDashboard/dashboard/LoadDashboard.xhtml?application=Earth&version=V5.

6.8. Embedding Dashboard Elements

All the charts displayed on the Squore Dashboard have a unique URL, so they can be embedded into other sites.

In order to find out what the URL of a chart is, follow these steps:

1. Log into Squore and view the dashboard of the project you want to get information from.
2. Click a chart to view it.
3. Click



the
icon

in the chart viewer to open the chart in a new browser window or tab.

4. Copy the URL of the chart, as displayed by your browser location bar.

The URL `http://localhost:8180/SQuORE_Server/squore/resource/chart/<CHART_UID>.png.xhtml` (the `?s=` parameter is a way to work around the browser cache) is a permalink to this chart for this project version.

6.9. Integration with Atlassian Confluence

It is possible to extract some elements from the Squore dashboard and integrate them into a Confluence page. This section details how to configure Squore Server and Confluence to trust each other and how to extract the URLs to display charts.

6.9.1. Squore Server Configuration

In order to allow Confluence to connect to Squore Server:

1. Edit <SQUORE_HOME>/server/standalone/configuration/standalone.xml
2. Find the security-domain element named **squore-policy**.
3. Add a new login-module element, as shown below:

```
<security-domain name="squore-policy" cache-type="default">
  <authentication>
    <login-module code="com.squoring.squore.server.security.TrustedLoginModule"
      flag="sufficient"/>
    (...)
  </authentication>
</security-domain>
```

4. Restart Squore Server to take the new configuration into account.

Tip

Because Confluence does not offer a single sign-on mechanism or authentication delegation, Confluence has to connect to Squore without using a password. This does not, however constitute a security risk, as the Squore user still has to exist and be allowed to view the target project in order for any information to be retrieved.

6.9.2. Confluence Admin Configuration

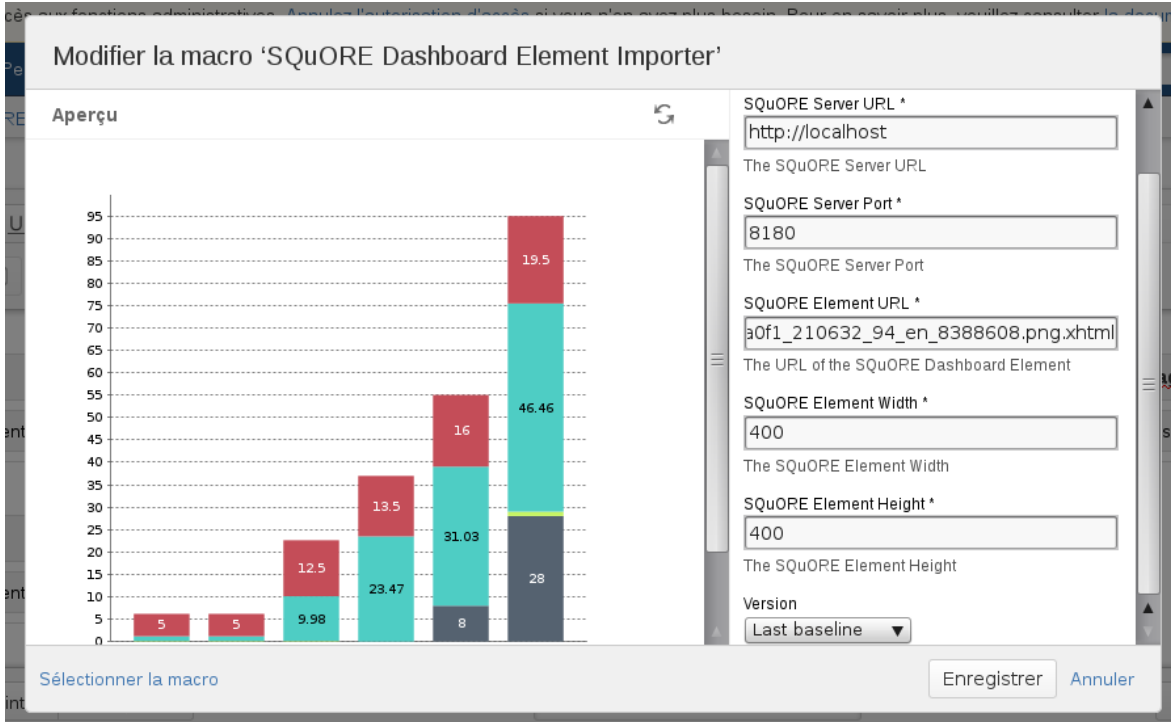
In order to allow Confluence users to add Squore elements, a Confluence administrator can create a macro to make it easier to include Squore elements into a page. You can find an example macro below.

```
## Macro title: Squore Dashboard Element Importer
## Macro category: External Content
## Macro has a body: N
## Body processing: No Body
##
## Developed by: Squoring Technologies
## Date created: 2013/07/28

## @param squrl:title=Squore Server URL|type=string|required=true|desc=The Squore
  Server URL
## @param sqport:title=Squore Server Port|type=string|required=true|desc=The
  Squore Server Port
## @param chart:title=Squore Element URL|type=string|required=true|desc=The URL
  of the Squore Dashboard Element
## @param sizex:title=Squore Element Width|type=string|required=true|desc= The
  Squore Element Width
## @param sizey:title=Squore Element Height|type=string|required=true|desc= The
  Squore Element Height
## @param version:title=Version|type=enum|enumValues=Current version,Last
  draft,Last baseline|default=Current version
#if ("Last draft"==$paramversion)
  #set($pversion="?version=last")
#elseif ("Last baseline"==$paramversion)
  #set($pversion="?version=last-baseline")
#else
  #set($pversion="")
#end
#set($login=$action.remoteUser.name)
<IFRAME frameborder="0" src="$paramsqurl:$paramsqport/SQuORE_Server/Export/
ChartExport.xhtml?user=$login&width=$paramsizex&height=$paramsizey&chart=
$paramchart$pversion" scrolling="no" width="$paramsizex" height="$paramsizey">
</IFRAME>
```

6.9.3. Adding Dashboard Elements

The macro you added in the previous section should be available to other Confluence users as the form show below from **External Content**.



The screenshot shows a Confluence macro configuration form titled "Modifier la macro 'SquORE Dashboard Element Importer'". On the left, there is a preview of a stacked bar chart with the following data series:

Bar Index	Series 1 (Red)	Series 2 (Cyan)	Series 3 (Dark Blue)
1	5	0	0
2	5	0	0
3	12.5	9.98	0
4	13.5	23.47	0
5	16	31.03	8
6	19.5	46.46	28

On the right, the configuration fields are:

- SquORE Server URL *: (The SquORE Server URL)
- SquORE Server Port *: (The SquORE Server Port)
- SquORE Element URL *: (The URL of the SquORE Dashboard Element)
- SquORE Element Width *: (The SquORE Element Width)
- SquORE Element Height *: (The SquORE Element Height)
- Version: (Dropdown menu)

Buttons at the bottom: "Sélectionner la macro", "Enregistrer", and "Annuler".

The Confluence Square form

Users need to fill in the following details:

- the Square Server URL
- the Square Server port
- the chart permalink (as retrieved according to the instructions in Section 6.8, "Embedding Dashboard Elements")
- the desired width of the chart
- the desired height of the chart
- the version of the chart to display (exact, last or last baseline)

Note

You can either link to the chart URL ending in **.png** or **.json**. Using the link ending with **.json** allows you to embed a fully interactive chart with tooltips and zoom functionality in Confluence, while the link ending in **.png** only displays a static image of the chart.

Tip

You can add several charts on the same Confluence page.

6.10. Integration with CollabNet TeamForge

Squore for TeamForge Integration does not require any additional installation procedure.

6.10.1. Squore Configuration

The connection module must be configured in the file `<SQUORE_HOME>/server/standalone/configuration/standalone.xml` by adding to the security-domain (name="squore-policy") / authentication section (before the **Database** login-module):

```
<login-module code="com.squoring.squore.server.security.CollabNetLoginModule"
  flag="sufficient" />
```

Restart Squore Server to apply the changes, and log in as administrator to finish configuring the integration via **Administration > System**. In the **Configuration** tab, fill in the information in the CollabNet section according to the values found in TeamForge.

- **TeamForge Server URL (without / at the end)**, for example `http://localhost`.
- **TeamForge Server Name (will appear in Squore export format list)**, for example `TeamForge`.
- **TeamForge artifact default status at export**, for example `Open`.
- **TeamForge artifact default priority at export**, for example `4`.
- **SvnEdge Main Repository URL**, for example `http://localhost/svn`.
- **SvnEdge Viewer (viewvc) URL**, for example `http://localhost/viewvc`.
- **External System Id of SvnEdge (for ex: exsy1001)**, for example `exsy1011`.

6.10.2. TeamForge Configuration

Squore is integrated into TeamForge as a "linked application". Steps to add a Squore access to a TeamForge project are:

Tab Configuration

Project Admin > Project Toolbar > Linked Application > Create

- Application Name: Squore
- URL: `http://localhost:8180/SQuORE_Server/Export/CollabNet.xhtml` (+ parameters)
- Single Sign On Enabled: yes

Possible parameters are:

- `squoreProjectId` (the related Squore project Id)
- `squoreVersionId` (the related Squore project version Id)
- `trackerId` (The Id of the TeamForge project tracker)

If the `squoreVersionId` is not defined, the last version of the project will be automatically loaded.

Some Examples: (if Squore is running on localhost and on port 8180)

- Squore project Id 13 (last version) and TeamForge tracker Id tracker1004
`http://localhost:8180/SQuORE_Server/Export/CollabNet.xhtml?squoreProjectId=13&trackerId=tracker1004`

→ Squore project Id 13, Squore project version 14 and TeamForge tracker Id tracker1004
*[http://localhost:8180/SQuORE_Server/Export/CollabNet.xhtml?
squareProjectId=13&squareVersionId=14&trackerId=tracker1004](http://localhost:8180/SQuORE_Server/Export/CollabNet.xhtml?squareProjectId=13&squareVersionId=14&trackerId=tracker1004)*

Tracker configuration

In order to see all fields of the Squore defect reports after export, the corresponding TeamForge tracker should have the following additional fields (individually optionals) with the "Text Entry" input type:

- SQ_Status
- SQ_Since
- SQ_Reasons
- SQ_Scope
- SQ_Artifact
- SQ_Path
- SQ_Comment

6.10.3. Integration Characteristics

Accessing Squore through TeamForge

The access to Squore is done through a new URL: **http://localhost:8180/SQuORE_Server/Export/CollabNet.xhtml**

Automatic connexion

When clicking on the Squore tab in TeamForge, the TeamForge user is automatically identified into Squore. If he is not a Squore user, the connexion is forbidden (error message).

The dashboard is shown and points directly on the specified project with the specified version. (or last version if the corresponding parameter is not defined)

Defect Report exports

If the user is on the specified project, a new export format is available (name: see Section 6.10.1, "Squore Configuration": `cntf.server.name`). The export button will directly export the selected defect reports under the form of new artifacts into the corresponding TeamForge tracker.

Source Code View

When visualising a source code, Squore retrieves the corresponding file using the viewvc application of the CollabNet SvnEdge server without asking the user a login and a password.

To use this functionality, the `cntf.svn.url`, `cntf.viewvc.url` and `cntf.svn.exsy` keys must be correctly set in the configuration file

If this functionality is not activated, the user has to use its own SVN login and password to access the source codes from Squore.

6.11. Squore Server Monitoring

Squore Server can be monitored with external tools on your network by connecting to administration URLs to retrieve information about the status of projects and users on the server.

- Access **http://localhost:8180/SQuORE_Server/servlets/state/sessions** to get a report of the current user sessions on Squore Server. The information is extracted as in CSV format as

```
session;login;session start;client
```

- Access **http://localhost:8180/SQuORE_Server/servlets/state/projects** to get a report of the existing projects on Squore Server. The information is extracted as in CSV format as

```
id;project name;model id;owner;creation time;number of versions;last  
version;last build;status;step start;step
```

The possible values of the **status** field are:

- **0** Finished: the version has been successfully created.
- **1** Warning: some warnings were raised during the last analysis.
- **2** Error: the analysis finished with an error.
- **3** Processing: the version is being created. When this status is returned, the current phase of the analysis will be specified in the **step** field and the time at which this step started will be specified in the **step start**.
- **4** Offline: this project has no versions.
- **5** Pending: this project is waiting for a free slot to start an analysis.

Note that in order to access these URLs you must be either:

- A logged-in user with the Administrator profile, in which case you can access the URL from anywhere.
- Requesting the URL from the computer that runs Squore Server, in which case the information is available without logging in.

Tip

By writing your own script that queries the monitoring URLs regularly and saving the output to a CSV file, you can feed the information into monitoring tools like Nagios and monitor the health of Squore Server.

7. Sizing Squore Server and Database

This chapter provides information about the resource utilisation and impact of running a Squore server over time.

7.1. Project Size and Growth

The disk space necessary for analyses varies depending on your analysis model as well as the amount of information analysed.

As a result, it is difficult to predict accurately the amount of space that your Squore installation will use. After a few runs, you should be able to estimate disk space requirements by working out the space required to analyse an artefact with your analysis model. Keep in mind that the first version of a project is always more costly than subsequent analyses, and that an analysis with only a few changes will use a lot less space than an analysis where there are a lot of changes.

Here is an example based on the Risk Index model, one of the standard multi-language models shipped in Squore 16.1.

Table 7.1. Project Characteristics

	First Code Snapshot	Second Code Snapshot
Language Distribution	C (13%), C++ (14%), Java (73%)	C (9%), C++ (11%), Java (80%)
Source Files	20000	30000 10% of previous code changed
Classes	28000	47000
Methods and Functions	181000	296000
Lines of Code	5.2M	7.6M
Effective Lines of Code	2.6M	3.6M
Findings	157000	234000
Action Items	7700	6300

Table 7.2. Model Characteristics

Average metrics per artefact	160
Average indicators per artefact	15

Table 7.3. Project Cost

	Database Growth	Project Folder Growth
V1 (Snapshot 1)	+3.5GB	+839MB
V2 (Snapshot 1)	+100MB	+1MB
V3 (Snapshot 2)	+3GB	+1.1GB

7.2. Saving Space by Deleting Old Data Files

You can save disk space by keeping data files generated by Squore only for the last baseline version. This behaviour is enabled by default and can be overridden either by using a setting in your <SQUORE_HOME>/

config.xml, or by changing the behaviour for each project. This can be useful when you want to debug the analysis data later.

- In order to save all data files for all versions by default for every project, open <SQUORE_HOME>/config.xml and `projects` element as shown below:

```
<projects directory="path/to/data/folder">  
  <data-providers keep-data-files="true"/>  
</projects>
```

The behaviour is applied after a server restart, and the old files are deleted when a new version is created.

- In order to override the behaviour for a particular project in the web interface, check or uncheck the **Keep old versions data files** box when creating a new version of the project or when managing the project.
- In order to override the behaviour for a particular project from the command line, use the parameter **keepDataFiles=true|false** when creating a new version of the project.

Appendix A. Reference pages

Name

install — Squore install script

Synopsis

```
install [options ...] data_dir
```

```
install -C [options ...] data_dir
```

```
install -U inst_dir [options ...]
```

Description

Installs and configures Squore.

The most useful options when installing Squore are `-b` to open Squore to the network (accesses are restricted to localhost by default, specify **0.0.0.0** to open the server to connections from all clients on the network), and `-k` to deploy a licence file.

Alternatively, when upgrading an existing installation, use `-U` to specify the directory to upgrade.

Squore data is stored in the `data_dir` directory.

Options

<code>-C</code>	Configure files only, does not create any database schema. This option may be used to reconfigure Squore after installation.
<code>-U <i>inst_dir</i></code>	Upgrade the installation pointed to by <i>inst_dir</i> .
<code>-v</code>	Increase verbosity level.
<code>-S</code>	Use remote PostgreSQL server. This option may be used to point on an existing server (no cluster is created).
<code>-P <i>pg_dir</i></code>	Location of PostgreSQL executables.
<code>-D <i>cluster_dir</i></code>	PostgreSQL cluster directory to create (default: <code>data_dir/cluster</code>).
<code>-s <i>size</i></code>	PostgreSQL shared buffers size, in MB. Defaults to 25% of the memory available on the server.
<code>-r <i>dbms</i></code>	Supported DBMS vendor (default: <code>postgresql</code>). Valid values: <code>postgresql, oracle</code> .
<code>-h <i>db_host</i></code>	Database server's host name (default: <code>localhost</code>).
<code>-p <i>db_port</i></code>	Database server's port number (default: DMBS dependent, <code>4561</code> for postgresql).
<code>-A <i>db_admin</i></code>	Database administrator name (default: DMBS dependent, <code>postgres</code> for postgresql).
<code>-d <i>db_name</i></code>	Squore database name (default: <code>squore</code>).
<code>-u <i>db_user</i></code>	Squore database user (default: <code>squore</code>).
<code>-e</code>	Pick existing user and database (recommended for Oracle Database).
<code>-J <i>java_home</i></code>	Specify the Java home to use. Defaults to <code>JAVA_HOME</code> , and, if this variable is not set, to an OS specific value.

<code>-x size</code>	Java memory allocation pool, in MB (Xmx option). Defaults to 25% of the memory available on the server, with a minimum of 512 MB.
<code>-b bind_address</code>	WildFly bind address (default: <code>localhost</code>). If you plan to use Squore from your local network, use <code>0.0.0.0</code> for the bind address. Otherwise access is restricted to connections from localhost only.
<code>-o binding_offset</code>	WildFly binding port offset (default: <code>100</code>). This number is added to the default (8080 for http) to calculate the set of ports used for Squore Server. An offset of 100 means that Squore is accessible via <code>http://localhost:8180/SQuORE_Server</code>
<code>-g PhantomJS port</code>	PhantomJS port (default: <code>3003</code>). The port to use for the embedded installation of PhantomJS.
<code>-T tmp_dir</code>	Squore temporary directory (default: <code>/tmp/squore</code>)
<code>-k squore-license.p7s</code>	Squore licensing key.

Arguments

<code>data_dir</code>	The Squore data directory, where Squore data is stored. That is, the database cluster (when managed by Squore), projects related files, and backups.
-----------------------	--

Name

`sqexport.pl` — Squore export utility

Synopsis

```
sqexport.pl [option...] versions -m [-l] [-u uid ] id_model
```

```
sqexport.pl [option...] versions -p [-l] [-u uid ] id_project
```

```
sqexport.pl [option...] artefacts -m [-R] [--add-measure measure ...] [-T type ...] [-L level ] [-u uid ] id_model
```

```
sqexport.pl [option...] artefacts -p [-R | -r id_rvers ] [--add-measure measure ...] [-T type ...] [-L level ] [-u uid ] id_project id_vers
```

Description

The **sqexport.pl** script connects to the Squore database and exports data into the CSV format.

This command extracts raw data from the database. That is, it does not read i18n files or model properties to translate strings.

Columns common to the `versions` and `artefacts` exports are:

1. `model_id` - the database identifier of the model (verbose mode only).
2. `model` - the model name.
3. `app_id` - the database identifier of the project (verbose mode only).
4. `app_name` - the project name.
5. `root_id` - the database identifier of the root artefact (verbose mode only).
6. `v_id` - the database identifier of the version (verbose mode only).
7. `v_name` - the version name.

Versions export

These additional columns are exported:

1. *status* - the project's version status.
2. *sl_rank* - the (numeric) rank of the level of the project.
3. *level* - the level of the project.
4. *app_name* - The project name.

```
sqexport.pl versions -m [-l] [-u uid ] id_model
```

This form exports all versions of projects that use the model identified by *id_model*. If *-l* is used, only the last version of each project is exported.

The *uid* is used to restrict output data, using access controls defined in Squore. If not supplied, versions and projects are exported regardless of access control lists.

```
sqexport.pl versions -p [-l] [-u uid ] id_project
```

This form exports all versions of the project identified by *id_project*. If *-l* is used, only the last version of the project is exported.

The *uid* is used to restrict output data, using access controls defined in Squore. If not supplied, versions and projects are exported regardless of access control lists.

Artefacts export

These additional columns are exported:

1. *art_id* - the database identifier of the artefact.
2. *art_path* - the path of the artefact.
3. *art_name* - the name of the artefact.
4. *type* - the type of the artefact.
5. *sl_rank* - the (numeric) rank of the level of the artefact.
6. *level* - the level of the artefact.
7. *trend* - the trend of the artefact, compared to the reference version (with *-R* or *-r* only). Values are 'N' for new artefacts, 'A' for artefacts that improved, 'V' for artefacts that regressed, and '=' for others.
8. * - the measure values, as specified with the *--add-measure* options.

```
sqexport.pl artefacts -m [-R] [--add-measure measure ...] [-T type ...] [-L level ] [-u uid ] id_model
```

Exports all artefacts of the *id_model* model, eventually filtered out by the *-T* and *-L* filters. Both parameters of these options are identifiers of the types and the level, as specified in the model. This is possible to specify types separated by a comma, or multiple *-T* options. Such types are then OR-ed.

Only artefacts that belong to the last version of projects are exported. If the *-R* option is set, the trend of levels of artefacts is computed against the last but one version of the projects. By default, there is no trend computation.

Use the *--add-measure* option to specify the list of measures to add to the output. Use with caution on large result sets.

The *uid* is used to restrict output data, using access controls defined in Squore. If not supplied, artefacts are exported, regardless of access control lists.

```
sqexport.pl artefacts -p [-R | -r id_rvers ] [--add-measure measure ...] [-T type ...] [-L level ] [-u uid ] id_project id_vers
```

This form exports artefacts of the *id_project* project in its *id_vers* version. If *id_vers* is not specified, the last version if the project is used. Artefacts may be filtered out with the *-T type* and *-L level* options.

The reference version to compute trends of levels of artefacts is either set with *-R* (use the version right before *id_vers*), or with *-r id_rvers* to set an explicit version of the project.

Use the *--add-measure* option to specify the list of measures to add to the output. Use with caution on large result sets.

The *uid* is used to restrict output data, using access controls defined in Squore. If not supplied, artefacts are exported, regardless of access control lists.

Global options

These options are common to all export types.

<i>-h host</i>	Overrides the database host name.
<i>-p port</i>	Overrides the database port number.
<i>-d dbname</i>	Overrides the database name.
<i>-u user</i>	Overrides the database user name.
<i>-f file</i>	Set the CSV output file. If not specified, the output is written to the standard output.
<i>-s sep</i>	Set the CSV separator. Defaults to the ';' character.
<i>-S slices</i>	Specifies a subset of columns to write, starting from 0. The column numbering is computed against the verbose mode, not the standard mode. Separate column numbers with the ',' character.
<i>-v</i>	Turns on the verbose mode. Exports additional columns (mainly internal database ids), and displays some SQL and post processing timings.

Export options

<i>-a</i>	Turns on export at the artefact level.
<i>-m</i>	Turns on export at the model level.
<i>-p</i>	Turns on export at the project level.
<i>-c</i>	Counts entries only, do not list all of them.
<i>-l</i>	Exports the last version of each project only.
<i>-R</i>	Set the reference version for delta or trend computations to the last but one version of the project, from either its last version, or the user supplied version.
<i>-r id_rvers</i>	Set the reference version for delta or trend computations to the version pointed to by the <i>id_rvers</i> .
<i>-T type ...</i>	Filter artefacts of types <i>type</i> , which is the external id of the artefact type, as specified by the model, like APPLICATION, CLASS, FUNCTION, etc. Types may be coma separated.

`-L level` Artefacts shall have the level *level*, which is the external id of the level of performance of a scale, as specified by the model, like LEVELA, LEVELB, etc.

Examples

```
sqexport.pl artefacts -m -T FILE -L LEVELG 1
```

This command lists all artefacts of type *FILE*, that are rated *LEVELG*. The scope of the search is limited to the artefacts that belong to the model *1*, which is its database id. There is no trend computation.

Exit status

- 0 CSV successfully generated.
- 2 Syntax or usage error.
- * The script failed. See stderr for an error message.

Name

`sqadm reset` — reset Squore data

Synopsis

```
sqadm reset -P
```

Description

This command clears both the database content, and internal storage files used by Squore. So far, the `-P` and `-D` options are mandatory.

The **sqadm reset** command shall be executed on a stopped Squore server, but a running database.

Options

- `-h, --help` Display help information and exit.
- `-P, --project-only` Reset project related data only.
Not supported for installations that use an Oracle database backend.
- `-y, --no-prompt` Use this option to keep management related settings, like roles, users, global settings, etc.
Do not prompt for confirmation.
- `--jdbc-url url` Database url of the form jdbc:subprotocol:subname.
- `--jdbc-user user` Database user.
- `-D dir, --data-dir dir` Squore projects directory.

Name

`sqadm version` — Display Squore version

Synopsis

```
sqadm version
```

Description

This command displays the version of Squore installed on your system and exits.

Name

sqctl — Squore launcher

Synopsis

```
sqctl [-c config.xml] start
```

```
sqctl [-c config.xml] stop
```

```
sqctl [-c config.xml] status
```

```
sqctl [-c config.xml] restart
```

Description

This launcher script is used to start and stop Squore Server, or query the status of the Squore Server processes.

Options

<code>-c <i>config.xml</i></code>	Specifies the <code>config.xml</code> file to read to start the server. Using this parameter is normally not needed.
<code>start</code>	Starts Squore Server by launching the following processes: <ol style="list-style-type: none">1. PostgreSQL (if Squore Server uses a local PostgreSQL cluster)2. PhantomJS3. WildFly
<code>stop</code>	Stops Squore Server by stopping the following processes: <ol style="list-style-type: none">1. WildFly2. PhantomJS3. PostgreSQL (if Squore Server uses a local PostgreSQL cluster)
<code>status</code>	Reports whether the PostgreSQL, PhantomJS and WildFly processes are running or stopped and exits.
<code>restart</code>	Stops and then starts Squore Server by stopping and starting the following processes: <ol style="list-style-type: none">1. WildFly2. PhantomJS3. PostgreSQL (if Squore Server uses a local PostgreSQL cluster)4. PostgreSQL (if Squore Server uses a local PostgreSQL cluster)5. PhantomJS6. WildFly

Appendix B. Squore XML Schemas

Download input-data-2.xsd [../shared_manual/input-data-2.xsd]

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified">

  <xs:simpleType name="id">
    <xs:restriction base="xs:string">
      <xs:pattern value="[A-Z_][A-Z0-9_]+" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="relax-status">
<xs:restriction base="id">
  <xs:enumeration value="RELAXED_DEROGATION"/>
  <xs:enumeration value="RELAXED_LEGACY"/>
  <xs:enumeration value="RELAXED_FALSE_POSITIVE"/>
</xs:restriction>
</xs:simpleType>

  <xs:element name="bundle">
    <xs:complexType>
      <xs:choice maxOccurs="unbounded">
        <xs:element ref="artifact"/>
        <xs:element ref="finding"/>
        <xs:element ref="info"/>
        <xs:element ref="link"/>
        <xs:element ref="metric"/>
      </xs:choice>
      <xs:attribute name="version" use="required" type="xs:integer" fixed="2"/>
    </xs:complexType>
  </xs:element>

  <xs:element name="artifact">
    <xs:complexType>
      <xs:sequence>
        <xs:choice minOccurs="0" maxOccurs="unbounded">
          <xs:element ref="artifact"/>
        </xs:choice>
        <xs:element ref="finding"/>
        <xs:element ref="metric"/>
        <xs:element ref="key"/>
        <xs:element ref="info"/>
        <xs:element ref="link"/>
        <xs:element ref="milestone"/>
      </xs:sequence>
      <xs:attribute name="alias"/>
      <xs:attribute name="art-location"/>
      <xs:attribute name="id"/>
      <xs:attribute name="local-art-location"/>
      <xs:attribute name="local-key"/>
      <xs:attribute name="local-parent"/>
      <xs:attribute name="location"/>
      <xs:attribute name="name"/>
      <xs:attribute name="parent"/>
      <xs:attribute name="path"/>
      <xs:attribute name="type" use="required" type="id"/>
    </xs:complexType>
  </xs:element>

```

```
<xs:attribute name="view-path"/>
</xs:complexType>
</xs:element>

<xs:element name="info">
  <xs:complexType>
    <xs:attribute name="local-ref"/>
    <xs:attribute name="name" use="required" type="id"/>
    <xs:attribute name="ref"/>
    <xs:attribute name="tool"/>
    <xs:attribute name="value" use="required"/>
  </xs:complexType>
</xs:element>

<xs:element name="key">
  <xs:complexType>
    <xs:attribute name="value" use="required"/>
  </xs:complexType>
</xs:element>

<xs:element name="metric">
  <xs:complexType>
    <xs:attribute name="local-ref"/>
    <xs:attribute name="name" use="required" type="id"/>
    <xs:attribute name="ref"/>
    <xs:attribute name="tool"/>
    <xs:attribute name="value" type="xs:decimal" use="required"/>
  </xs:complexType>
</xs:element>

<xs:element name="link">
  <xs:complexType>
    <xs:attribute name="dst"/>
    <xs:attribute name="local-dst" type="xs:integer"/>
    <xs:attribute name="local-src" type="xs:integer"/>
    <xs:attribute name="name" use="required" type="id"/>
    <xs:attribute name="src"/>
  </xs:complexType>
</xs:element>

<xs:element name="finding">
  <xs:complexType>
    <xs:sequence>
      <xs:element minOccurs="0" maxOccurs="unbounded" ref="location"/>
      <xs:element minOccurs="0" maxOccurs="1" ref="relax"/>
    </xs:sequence>
    <xs:attribute name="descr"/>
    <xs:attribute name="local-ref"/>
    <xs:attribute name="location" use="required"/>
    <xs:attribute name="name" use="required" type="id"/>
    <xs:attribute name="p0"/>
    <xs:attribute name="p1"/>
    <xs:attribute name="p2"/>
    <xs:attribute name="p3"/>
    <xs:attribute name="p4"/>
    <xs:attribute name="p5"/>
    <xs:attribute name="p6"/>
    <xs:attribute name="p7"/>
    <xs:attribute name="p8"/>
  </xs:complexType>
</xs:element>
```

```

        <xs:attribute name="p9" />
        <xs:attribute name="ref" />
        <xs:attribute name="tool" />
    </xs:complexType>
</xs:element>

<xs:element name="location">
    <xs:complexType>
        <xs:attribute name="local-ref" />
        <xs:attribute name="location" use="required" />
        <xs:attribute name="ref" />
    </xs:complexType>
</xs:element>

<xs:element name="relax">
    <xs:complexType>
        <xs:simpleContent>
            <xs:extension base="xs:string">
                <xs:attribute name="status" type="relax-status" />
            </xs:extension>
        </xs:simpleContent>
    </xs:complexType>
</xs:element>

<xs:element name="milestone">
    <xs:complexType>
        <xs:sequence>
            <xs:element minOccurs="0" maxOccurs="unbounded" ref="goal" />
        </xs:sequence>
        <xs:attribute name="date" type="xs:integer" />
        <xs:attribute name="name" use="required" type="id" />
    </xs:complexType>
</xs:element>

<xs:element name="goal">
    <xs:complexType>
        <xs:attribute name="name" use="required" type="id" />
        <xs:attribute name="value" use="required" type="xs:decimal" />
    </xs:complexType>
</xs:element>
</xs:schema>

```

Download form.xsd [../shared_manual/form.xsd]

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
    elementFormDefault="qualified">

    <xs:simpleType name="id">
        <xs:restriction base="xs:string">
            <xs:pattern value='[A-Z_][A-Z0-9_]+' />
        </xs:restriction>
    </xs:simpleType>

    <xs:simpleType name="project-status">
        <xs:restriction base="id">
            <xs:enumeration value="IGNORE" />
            <xs:enumeration value="WARNING" />
            <xs:enumeration value="ERROR" />
        </xs:restriction>
    </xs:simpleType>

```

```
</xs:restriction>
</xs:simpleType>

<xs:element name="tags">
  <xs:complexType>
    <xs:sequence>
      <xs:element maxOccurs="0" ref="tag"/>
      <xs:element maxOccurs="0" ref="exec-phase"/>
    </xs:sequence>
    <xs:attribute name="baseName" />
    <xs:attribute name="deleteTmpSrc" type="xs:boolean"/>
    <xs:attribute name="image" />
    <xs:attribute name="needSources" type="xs:boolean"/>
    <xs:attribute name="projectStatusOnFailure" type="project-status"/>
  </xs:complexType>
</xs:element>

<xs:element name="tag">
  <xs:complexType>
    <xs:sequence>
      <xs:element minOccurs="0" maxOccurs="unbounded" ref="value"/>
    </xs:sequence>
    <xs:attribute name="changeable" type="xs:boolean"/>
    <xs:attribute name="credentialType" />
    <xs:attribute name="defaultValue" />
    <xs:attribute name="displayType" />
    <xs:attribute name="key" use="required"/>
    <xs:attribute name="optionTitle" />
    <xs:attribute name="required" type="xs:boolean"/>
    <xs:attribute name="style" />
    <xs:attribute name="type" use="required"/>
  </xs:complexType>
</xs:element>

<xs:element name="value">
  <xs:complexType>
    <xs:attribute name="key" use="required"/>
    <xs:attribute name="option" />
  </xs:complexType>
</xs:element>

<xs:element name="exec-phase">
  <xs:complexType>
    <xs:sequence>
      <xs:element minOccurs="0" ref="exec"/>
      <xs:element minOccurs="0" ref="exec-tool"/>
    </xs:sequence>
    <xs:attribute name="id" use="required"/>
  </xs:complexType>
</xs:element>

<xs:element name="exec">
  <xs:complexType>
    <xs:sequence>
      <xs:element maxOccurs="0" ref="arg"/>
    </xs:sequence>
    <xs:attribute name="name" use="required"/>
  </xs:complexType>
</xs:element>
```

```

<xs:element name="arg">
  <xs:complexType>
    <xs:attribute name="tag"/>
    <xs:attribute name="value"/>
    <xs:attribute name="defaultValue"/>
  </xs:complexType>
</xs:element>

<xs:element name="exec-tool">
  <xs:complexType>
    <xs:sequence>
      <xs:element maxOccurs="0" ref="param"/>
    </xs:sequence>
    <xs:attribute name="name" use="required"/>
  </xs:complexType>
</xs:element>

<xs:element name="param">
  <xs:complexType>
    <xs:attribute name="key" use="required"/>
    <xs:attribute name="tag"/>
    <xs:attribute name="value"/>
    <xs:attribute name="defaultValue"/>
  </xs:complexType>
</xs:element>
</xs:schema>

```

Download properties-1.2.xsd [../shared_manual/properties-1.2.xsd]

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" version="1.0">

  <xs:element name="Bundle" type="bundleType"/>

  <xs:complexType name="bundleType">
    <xs:sequence>
      <xs:choice minOccurs="0" maxOccurs="unbounded">
        <xs:element name="help" type="helpType" minOccurs="0" maxOccurs="unbounded"/>
        <xs:element name="hideObsoleteModels" type="obsoleteType" minOccurs="0"
maxOccurs="1"/>
        <xs:element name="hideModel" type="hiddenType" minOccurs="0"
maxOccurs="unbounded"/>
        <xs:element name="explorerTabs" type="tabsType" minOccurs="0" maxOccurs="1"/>
        <xs:element name="explorerTrees" type="treesType" minOccurs="0"
maxOccurs="1"/>
        <xs:element name="option" type="optionType" minOccurs="0"
maxOccurs="unbounded"/>
      </xs:choice>
    </xs:sequence>
    <xs:attribute name="version" use="required" type="xs:string"/>
  </xs:complexType>

  <xs:complexType name="helpType">
    <xs:attribute name="label" use="required" type="xs:string"/>
    <xs:attribute name="url" use="required" type="xs:anyURI"/>
    <xs:attribute name="profiles" use="optional" type="xs:string"/>
  </xs:complexType>

  <xs:complexType name="optionType">

```

```

<xs:attribute name="name" use="required" type="xs:string"/>
<xs:attribute name="value" use="required" type="xs:string"/>
</xs:complexType>

<xs:complexType name="obsoleteType">
  <xs:attribute name="value" use="optional" default="false" type="xs:boolean"/>
</xs:complexType>

<xs:complexType name="hiddenType">
  <xs:attribute name="name" use="required" type="xs:string"/>
</xs:complexType>

<xs:complexType name="tabsType">
  <xs:sequence maxOccurs="unbounded">
    <xs:element name="tab" type="tabType" maxOccurs="unbounded" />
  </xs:sequence>
  <xs:attribute name="hideSettings" use="optional" default="false"
type="xs:boolean"/>
</xs:complexType>

<xs:complexType name="tabType">
  <xs:attribute name="name" use="required" type="xs:string"/>
  <xs:attribute name="default" use="optional" default="false" type="xs:boolean"/>
  <xs:attribute name="mandatory" use="optional" default="false"
type="xs:boolean"/>
  <xs:attribute name="rendered" use="optional" default="true" type="xs:boolean"/>
</xs:complexType>

<xs:complexType name="treesType">
  <xs:sequence maxOccurs="unbounded">
    <xs:element name="tree" type="treeType" maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>

<xs:complexType name="treeType">
  <xs:attribute name="name" use="required" type="xs:string"/>
  <xs:attribute name="rendered" use="optional" default="true" type="xs:boolean"/>
</xs:complexType>
</xs:schema>

```

Download config-1.3.xsd [../shared_manual/config-1.3.xsd]

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" version="1.0">

  <xs:element name="squore" type="squoreType"/>

  <xs:complexType name="squoreType">
    <xs:sequence>
      <xs:element name="paths" type="pathsType"/>
      <xs:element name="database" type="databaseType" minOccurs="0"/>
      <xs:element name="phantomjs" type="phantomjsType" minOccurs="0"/>
      <xs:element name="configuration" type="directoriesType"/>
      <xs:element name="addons" type="directoriesType"/>
      <xs:element name="client" type="dataDirectoriesType" minOccurs="0"/>
      <xs:element name="tmp" type="directoryType" minOccurs="0"/>
      <xs:element name="projects" type="projectType" minOccurs="0"/>
      <xs:element name="sources" type="directoryType" minOccurs="0"/>
      <xs:element name="workspace" type="directoryType" minOccurs="0"/>
    </xs:sequence>
  </xs:complexType>

```

```
</xs:sequence>
<xs:attribute name="type" use="required" type="xs:string"/>
<xs:attribute name="version" use="required" type="xs:string"/>
</xs:complexType>

<xs:complexType name="pathsType">
  <xs:sequence maxOccurs="unbounded">
    <xs:element name="path" type="pathType"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="pathType">
  <xs:attribute name="name" use="required" type="xs:string"/>
  <xs:attribute name="path" use="required" type="xs:string"/>
</xs:complexType>

<xs:complexType name="directoriesType">
  <xs:sequence maxOccurs="unbounded">
    <xs:element name="path" type="directoryType"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="directoryType">
  <xs:attribute name="directory" use="required" type="xs:string"/>
</xs:complexType>

<xs:complexType name="databaseType">
  <xs:sequence>
    <xs:element name="postgresql" type="directoryType" minOccurs="0"/>
    <xs:element name="cluster" type="directoryType" minOccurs="0"/>
    <xs:element name="backup" type="directoryType"/>
    <xs:element name="security" type="securityType" minOccurs="0"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="phantomjsType">
  <xs:sequence>
    <xs:element name="socket-binding" type="socketBindingType" minOccurs="0"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="socketBindingType">
  <xs:attribute name="address" type="xs:string" default="127.0.0.1"/>
  <xs:attribute name="port" type="xs:short" default="3003"/>
  <xs:attribute name="square-url" type="xs:string" default=""/>
  <xs:attribute name="distant-url" type="xs:string" default=""/>
</xs:complexType>

<xs:complexType name="securityType">
  <xs:sequence>
    <xs:element name="user-name" type="xs:string"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="dataDirectoriesType">
  <xs:sequence>
    <xs:element name="tmp" type="directoryType" minOccurs="0"/>
    <xs:element name="projects" type="projectType" minOccurs="0"/>
    <xs:element name="sources" type="directoryType" minOccurs="0"/>
  </xs:sequence>
</xs:complexType>
```

```

</xs:sequence>
</xs:complexType>

<xs:complexType name="projectType">
  <xs:sequence>
    <xs:element name="data-providers" type="dpType" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="directory" use="required" type="xs:string"/>
</xs:complexType>

<xs:complexType name="dpType">
  <xs:attribute name="keep-data-files" use="required" type="xs:boolean"/>
</xs:complexType>

</xs:schema>

```

Download analysis.xsd [../shared_manual/analysis.xsd]

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified">

  <xs:simpleType name="id">
    <xs:restriction base="xs:string">
      <xs:pattern value="[A-Z_][A-Z0-9_]+" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="list-id">
    <xs:restriction base="xs:string">
      <xs:pattern value="[A-Z_][A-Z0-9_]+(;[A-Z_][A-Z0-9_]+)*" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="families">
    <xs:restriction base="xs:string">
      <xs:pattern value="[A-Z0-9_]+(;[A-Z_][A-Z0-9_]+)*" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="categories">
    <xs:restriction base="xs:string">
      <xs:pattern value="[A-Z_][A-Z0-9_]+\.[A-Z_][A-Z0-9_]+(;[A-Z_][A-Z0-9_]+\.[A-Z_][A-Z0-9_]+)*" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="measure-type">
    <xs:restriction base="id">
      <xs:enumeration value="METRIC"/>
      <xs:enumeration value="RULE"/>
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="format">
    <xs:restriction base="id">
      <xs:enumeration value="NUMBER"/>
      <xs:enumeration value="PERCENT"/>
      <xs:enumeration value="INTEGER"/>
      <xs:enumeration value="DATE"/>
    </xs:restriction>
  </xs:simpleType>

```



```

<xs:enumeration value="DATETIME" />
<xs:enumeration value="TIME" />
<xs:enumeration value="DAYS" />
<xs:enumeration value="HOURS" />
<xs:enumeration value="MINUTES" />
<xs:enumeration value="SECONDS" />
<xs:enumeration value="MILLISECONDS" />
<xs:enumeration value="MAN_DAYS" />
<xs:enumeration value="MAN_HOURS" />
<xs:enumeration value="MAN_MINUTES" />
<xs:enumeration value="MAN_SECONDS" />
<xs:enumeration value="MAN_MILLISECONDS" />
</xs:restriction>
</xs:simpleType>

<xs:simpleType name="datetime-style">
<xs:restriction base="id">
<xs:enumeration value="DEFAULT" />
<xs:enumeration value="SHORT" />
<xs:enumeration value="MEDIUM" />
<xs:enumeration value="LONG" />
<xs:enumeration value="FULL" />
</xs:restriction>
</xs:simpleType>

<xs:simpleType name="rounding-mode">
<xs:restriction base="id">
<xs:enumeration value="UP" />
<xs:enumeration value="DOWN" />
<xs:enumeration value="CEILING" />
<xs:enumeration value="FLOOR" />
<xs:enumeration value="HALF_UP" />
<xs:enumeration value="HALF_DOWN" />
<xs:enumeration value="HALF_EVEN" />
</xs:restriction>
</xs:simpleType>

<xs:simpleType name="bounds-type">
<xs:restriction base="xs:string">
<xs:pattern value='[\[\]]((-)*[0-9](\.[0-9]+)?)*;((-)*[0-9](
[0-9]+)?)*[\[\]]' />
</xs:restriction>
</xs:simpleType>

<xs:simpleType name="path-scope">
<xs:restriction base="id">
<xs:enumeration value="CHILDREN" />
<xs:enumeration value="DESCENDANTS" />
</xs:restriction>
</xs:simpleType>

<xs:complexType name="elements">
<xs:sequence>
<xs:choice minOccurs="0" maxOccurs="unbounded">
<xs:element ref="ArtefactType" />
<xs:element ref="Indicator" />
<xs:element ref="Measure" />
<xs:element ref="Package" />
<xs:element ref="package" />

```

```
<xs:element ref="Scale" />
<xs:element ref="ScaleMacro" />
<xs:element ref="Constant" />
<xs:element ref="RootIndicator" />
<xs:element ref="UpdateRules" />
<xs:element ref="UpdateRule" />
<xs:element ref="Link" />
<xs:element ref="ComputedLink" />
</xs:choice>
</xs:sequence>
<xs:attribute name="providedBy" />
<xs:attribute name="name" />
<xs:attribute name="storedOnlyIfDisplayed" type="xs:boolean" />
</xs:complexType>

<xs:element name="Bundle" type="elements" />

<xs:element name="Package" type="elements" />
<xs:element name="package" type="elements" />

<xs:element name="Constant">
  <xs:complexType>
    <xs:attribute name="id" use="required" type="id" />
    <xs:attribute name="value" use="required" />
  </xs:complexType>
</xs:element>

<xs:element name="RootIndicator">
  <xs:complexType>
    <xs:attribute name="artefactTypes" use="required" type="list-id" />
    <xs:attribute name="indicatorId" use="required" type="id" />
  </xs:complexType>
</xs:element>

<xs:element name="UpdateRules">
  <xs:complexType>
    <xs:sequence>
      <xs:element minOccurs="0" maxOccurs="unbounded" ref="UpdateRule" />
    </xs:sequence>
  </xs:complexType>
</xs:element>

<xs:element name="UpdateRule">
  <xs:complexType>
    <xs:attribute name="categories" type="categories" />
    <xs:attribute name="disabled" type="xs:boolean" />
    <xs:attribute name="measureId" use="required" type="id" />
  </xs:complexType>
</xs:element>

<xs:element name="Measure">
  <xs:complexType>
    <xs:sequence>
      <xs:element minOccurs="0" maxOccurs="unbounded" ref="Computation" />
    </xs:sequence>
    <xs:attribute name="acceptMissingValue" type="xs:boolean" />
    <xs:attribute name="categories" type="categories" />
    <xs:attribute name="dataBounds" type="bounds-type" />
    <xs:attribute name="dateStyle" type="datetime-style" />
  </xs:complexType>
</xs:element>
```

```

<xs:attribute name="decimals" type="xs:integer"/>
<xs:attribute name="defaultValue" type="xs:decimal"/>
<xs:attribute name="excludingTypes" type="list-id"/>
<xs:attribute name="invalidValue"/>
<xs:attribute name="families" type="families"/>
<xs:attribute name="format" type="format"/>
<xs:attribute name="manual" type="xs:boolean"/>
<xs:attribute name="measureId" use="required" type="id"/>
<xs:attribute name="noValue"/>
<xs:attribute name="pattern"/>
<xs:attribute name="roundingMode" type="rounding-mode"/>
<xs:attribute name="suffix"/>
<xs:attribute name="targetArtefactTypes"/>
<xs:attribute name="timeStyle" type="datetime-style"/>
<xs:attribute name="toolName"/>
<xs:attribute name="toolVersion"/>
<xs:attribute name="type" type="measure-type"/>
<xs:attribute name="usedForRelaxation" type="xs:boolean"/>
</xs:complexType>
</xs:element>

<xs:element name="Computation">
  <xs:complexType>
    <xs:attribute name="continueOnRelaxed" type="xs:boolean"/>
    <xs:attribute name="excludingTypes" type="list-id"/>
    <xs:attribute name="result" use="required"/>
    <xs:attribute name="stored" type="xs:boolean"/>
    <xs:attribute name="targetArtefactTypes" use="required" type="list-id"/>
  </xs:complexType>
</xs:element>

<xs:element name="Indicator">
  <xs:complexType>
    <xs:attribute name="displayedScale" type="id"/>
    <xs:attribute name="displayedValue" type="id"/>
    <xs:attribute name="displayTypes" type="list-id"/>
    <xs:attribute name="excludingTypes" type="list-id"/>
    <xs:attribute name="families" type="families"/>
    <xs:attribute name="indicatorId" use="required" type="id"/>
    <xs:attribute name="measureId" type="id"/>
    <xs:attribute name="scaleId" type="id"/>
    <xs:attribute name="targetArtefactTypes" type="list-id"/>
  </xs:complexType>
</xs:element>

<xs:element name="Scale">
  <xs:complexType>
    <xs:sequence>
      <xs:element minOccurs="0" maxOccurs="unbounded" ref="ScaleLevel"/>
    </xs:sequence>
    <xs:attribute name="isDynamic" type="xs:boolean"/>
    <xs:attribute name="macro" type="id"/>
    <xs:attribute name="scaleId" use="required" type="id"/>
    <xs:attribute name="targetArtefactTypes" type="list-id"/>
    <xs:attribute name="vars"/>
  </xs:complexType>
</xs:element>

<xs:element name="ScaleMacro">

```

```
<xs:complexType>
  <xs:sequence>
    <xs:element maxOccurs="unbounded" ref="ScaleLevel" />
  </xs:sequence>
  <xs:attribute name="id" use="required" type="id" />
  <xs:attribute name="isDynamic" type="xs:boolean" />
</xs:complexType>
</xs:element>

<xs:element name="ArtefactType">
  <xs:complexType>
    <xs:attribute name="heirs" type="list-id" />
    <xs:attribute name="id" use="required" type="id" />
    <xs:attribute name="manual" type="xs:boolean" />
    <xs:attribute name="parents" type="list-id" />
  </xs:complexType>
</xs:element>

<xs:element name="ScaleLevel">
  <xs:complexType>
    <xs:attribute name="bounds" use="required" />
    <xs:attribute name="levelId" use="required" type="id" />
    <xs:attribute name="rank" use="required" />
  </xs:complexType>
</xs:element>

<xs:element name="Link">
  <xs:complexType>
    <xs:attribute name="id" use="required" type="id" />
    <xs:attribute name="inArtefactTypes" type="list-id" />
    <xs:attribute name="outArtefactTypes" type="list-id" />
    <xs:attribute name="srcArtefactTypes" type="list-id" />
    <xs:attribute name="dstArtefactTypes" type="list-id" />
  </xs:complexType>
</xs:element>

<xs:element name="ComputedLink">
  <xs:complexType>
    <xs:sequence>
      <xs:element minOccurs="1" maxOccurs="1" ref="StartPath" />
      <xs:element minOccurs="0" maxOccurs="unbounded" ref="NextPath" />
    </xs:sequence>
    <xs:attribute name="id" use="required" type="id" />
  </xs:complexType>
</xs:element>

<xs:element name="StartPath">
  <xs:complexType>
    <xs:attribute name="link" type="id" />
    <xs:attribute name="scope" type="path-scope" />
    <xs:attribute name="srcArtefactTypes" type="list-id" />
    <xs:attribute name="dstArtefactTypes" type="list-id" />
    <xs:attribute name="srcCondition" />
    <xs:attribute name="dstCondition" />
    <xs:attribute name="recurse" type="xs:boolean" />
    <xs:attribute name="keepIntermediateLinks" type="xs:boolean" />
  </xs:complexType>
</xs:element>
```

```

<xs:element name="NextPath">
  <xs:complexType>
    <xs:attribute name="link" type="id"/>
    <xs:attribute name="scope" type="path-scope"/>
    <xs:attribute name="dstArtefactTypes" type="list-id"/>
    <xs:attribute name="dstCondition"/>
    <xs:attribute name="recurse" type="xs:boolean"/>
    <xs:attribute name="keepIntermediateLinks" type="xs:boolean"/>
  </xs:complexType>
</xs:element>
</xs:schema>
    
```

Download decision.xsd [../shared_manual/decision.xsd]

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified">

  <xs:simpleType name="id">
    <xs:restriction base="xs:string">
      <xs:pattern value='[A-Z_][A-Z0-9_]+' />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="list-id">
    <xs:restriction base="xs:string">
      <xs:pattern value='[A-Z_][A-Z0-9_]+(;[A-Z_][A-Z0-9_]+)*' />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="categories">
    <xs:restriction base="xs:string">
      <xs:pattern value='[A-Z_][A-Z0-9_]+\.[A-Z_][A-Z0-9_]+(;[A-Z_][A-Z0-9_]+\.[A-Z_][A-Z0-9_]+)*' />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="criterion-type">
    <xs:restriction base="id">
      <xs:enumeration value="BENEFIT"/>
      <xs:enumeration value="COST"/>
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="preference-level">
    <xs:restriction base="id">
      <xs:enumeration value="VERY_LOW"/>
      <xs:enumeration value="LOW"/>
      <xs:enumeration value="MEDIUM"/>
      <xs:enumeration value="HIGH"/>
      <xs:enumeration value="VERY_HIGH"/>
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="elements">
    <xs:sequence>
      <xs:choice minOccurs="0" maxOccurs="unbounded">
        <xs:element ref="Package"/>
        <xs:element ref="package"/>
        <xs:element ref="DecisionCriteria"/>
      </xs:choice>
    </xs:sequence>
  </xs:complexType>
    
```

```
<xs:element ref="DecisionCriterion"/>
<xs:element ref="FindingsActionPlan"/>
</xs:choice>
</xs:sequence>
</xs:complexType>

<xs:element name="Bundle" type="elements"/>
<xs:element name="Package" type="elements"/>
<xs:element name="package" type="elements"/>
<xs:element name="DecisionCriteria" type="elements"/>

<xs:element name="DecisionCriterion">
<xs:complexType>
<xs:sequence>
<xs:element ref="Triggers"/>
</xs:sequence>
<xs:attribute name="categories" type="categories"/>
<xs:attribute name="dcId" use="required" type="id"/>
<xs:attribute name="excludingTypes" type="list-id"/>
<xs:attribute name="families" type="list-id"/>
<xs:attribute name="roles" type="list-id"/>
<xs:attribute name="targetArtefactTypes" use="required" type="list-id"/>
</xs:complexType>
</xs:element>

<xs:element name="Triggers">
<xs:complexType>
<xs:sequence>
<xs:element maxOccurs="unbounded" ref="Trigger"/>
</xs:sequence>
</xs:complexType>
</xs:element>

<xs:element name="Trigger">
<xs:complexType>
<xs:sequence>
<xs:element maxOccurs="unbounded" ref="Test"/>
</xs:sequence>
</xs:complexType>
</xs:element>

<xs:element name="Test">
<xs:complexType>
<xs:attribute name="bounds"/>
<xs:attribute name="descrId" type="id"/>
<xs:attribute name="expr" use="required"/>
<xs:attribute name="p0"/>
<xs:attribute name="p1"/>
<xs:attribute name="p2"/>
<xs:attribute name="p3"/>
<xs:attribute name="p4"/>
<xs:attribute name="p5"/>
<xs:attribute name="p6"/>
<xs:attribute name="p7"/>
<xs:attribute name="p8"/>
<xs:attribute name="p9"/>
<xs:attribute name="suspect"/>
</xs:complexType>
</xs:element>
```

```

<xs:element name="FindingsActionPlan">
  <xs:complexType>
    <xs:sequence>
      <xs:choice minOccurs="0" maxOccurs="unbounded">
        <xs:element ref="CategoryCriterion"/>
        <xs:element ref="OccurrencesCriterion"/>
        <xs:element ref="VariableCriterion"/>
      </xs:choice>
    </xs:sequence>
    <xs:attribute name="limit" type="xs:integer"/>
    <xs:attribute name="priorityScaleId" type="id"/>
  </xs:complexType>
</xs:element>

<xs:element name="CategoryCriterion">
  <xs:complexType>
    <xs:attribute name="type" type="criterion-type"/>
    <xs:attribute name="preferenceLevel" type="preference-level"/>
    <xs:attribute name="scaleId" use="required" type="id"/>
    <xs:attribute name="excludeLevels" type="list-id"/>
  </xs:complexType>
</xs:element>

<xs:element name="OccurrencesCriterion">
  <xs:complexType>
    <xs:attribute name="type" type="criterion-type"/>
    <xs:attribute name="preferenceLevel" type="preference-level"/>
    <xs:attribute name="scaleId" type="id"/>
    <xs:attribute name="excludeLevels" type="list-id"/>
  </xs:complexType>
</xs:element>

<xs:element name="VariableCriterion">
  <xs:complexType>
    <xs:attribute name="type" type="criterion-type"/>
    <xs:attribute name="preferenceLevel" type="preference-level"/>
    <xs:attribute name="indicatorId" use="required" type="id"/>
    <xs:attribute name="excludeLevels" type="list-id"/>
  </xs:complexType>
</xs:element>
</xs:schema>
    
```

Download description.xsd [../shared_manual/description.xsd]

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified">

  <xs:complexType name="elements">
    <xs:sequence>
      <xs:choice minOccurs="0" maxOccurs="unbounded">
        <xs:element ref="Package"/>
        <xs:element ref="package"/>
        <xs:element ref="Properties"/>
      </xs:choice>
    </xs:sequence>
  </xs:complexType>

  <xs:element name="Bundle">
    
```

```
<xs:complexType>
  <xs:sequence>
    <xs:choice minOccurs="0" maxOccurs="unbounded">
      <xs:element ref="Package" />
      <xs:element ref="package" />
      <xs:element ref="Properties" />
    </xs:choice>
  </xs:sequence>
  <xs:attribute name="available" />
  <xs:attribute name="default" />
</xs:complexType>
</xs:element>

<xs:element name="Package" type="elements" />
<xs:element name="package" type="elements" />

<xs:element name="Properties">
  <xs:complexType>
    <xs:attribute name="src" use="required" />
  </xs:complexType>
</xs:element>
</xs:schema>
```

Download exports.xsd [../shared_manual/exports.xsd]

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified">

  <xs:simpleType name="type-id">
    <xs:restriction base="xs:string">
      <xs:pattern value="[A-Z0-9_]*" />
    </xs:restriction>
  </xs:simpleType>

  <xs:element name="Bundle">
    <xs:complexType>
      <xs:sequence minOccurs="0" maxOccurs="unbounded">
        <xs:element ref="Role" />
      </xs:sequence>
    </xs:complexType>
  </xs:element>

  <xs:element name="Role">
    <xs:complexType>
      <xs:sequence minOccurs="0" maxOccurs="unbounded">
        <xs:element ref="Export" />
      </xs:sequence>
      <xs:attribute name="name" use="required" type="xs:string" />
    </xs:complexType>
  </xs:element>

  <xs:element name="Export">
    <xs:complexType>
      <xs:sequence maxOccurs="unbounded">
        <xs:element ref="ExportScript" />
      </xs:sequence>
      <xs:attribute name="type" use="required" type="type-id" />
    </xs:complexType>
  </xs:element>
```



```

<xs:element name="ExportScript">
  <xs:complexType>
    <xs:sequence>
      <xs:element minOccurs="0" maxOccurs="unbounded" ref="arg" />
    </xs:sequence>
    <xs:attribute name="name" use="required" type="xs:string" />
    <xs:attribute name="script" use="required" type="xs:string" />
  </xs:complexType>
</xs:element>

<xs:element name="arg">
  <xs:complexType>
    <xs:attribute name="value" use="required" type="xs:string" />
    <xs:attribute name="optional" use="optional" type="xs:boolean"
default="false" />
  </xs:complexType>
</xs:element>

</xs:schema>

```

Download highlights.xsd [../shared_manual/highlights.xsd]

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">

  <xs:simpleType name="id">
    <xs:restriction base="xs:string">
      <xs:pattern value='[A-Z0-9_]*' />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="measure-id">
    <xs:restriction base="xs:string">
      <xs:pattern value='([BD].)?[A-Z0-9_]*' />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="info-id">
    <xs:restriction base="xs:string">
      <xs:pattern value='[A-Z0-9_]*' />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="indicator-id">
    <xs:restriction base="xs:string">
      <xs:pattern value='([I].)?[A-Z0-9_]*' />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="bounds-type">
    <xs:restriction base="xs:string">
      <xs:pattern value='[\[\]]((-)*[0-9](\[0-9\]+)?)*;((-)*[0-9](\[0-9\]+)?)*[\[\]]' />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="top-order">
    <xs:restriction base="xs:string">
      <xs:enumeration value="ASC" />
    </xs:restriction>
  </xs:simpleType>

```

```
<xs:enumeration value="DESC" />
</xs:restriction>
</xs:simpleType>

<xs:simpleType name="result-size">
  <xs:union>
    <xs:simpleType>
      <xs:restriction base="xs:positiveInteger" />
    </xs:simpleType>
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:enumeration value="*" />
      </xs:restriction>
    </xs:simpleType>
  </xs:union>
</xs:simpleType>

<xs:simpleType name="header-display-type">
  <xs:restriction base="xs:string">
    <xs:enumeration value="MNEMONIC" />
    <xs:enumeration value="NAME" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="display-type">
  <xs:restriction base="xs:string">
    <xs:enumeration value="VALUE" />
    <xs:enumeration value="RANK" />
    <xs:enumeration value="ICON" />
    <xs:enumeration value="DATE" />
    <xs:enumeration value="DATETIME" />
    <xs:enumeration value="TIME" />
    <xs:enumeration value="NAME" />
    <xs:enumeration value="MNEMONIC" />
  </xs:restriction>
</xs:simpleType>

<xs:simpleType name="date-style">
  <xs:restriction base="xs:string">
    <xs:enumeration value="SHORT" />
    <xs:enumeration value="MEDIUM" />
    <xs:enumeration value="DEFAULT" />
    <xs:enumeration value="LONG" />
    <xs:enumeration value="FULL" />
  </xs:restriction>
</xs:simpleType>

<xs:element name="Bundle">
  <xs:complexType>
    <xs:sequence maxOccurs="unbounded">
      <xs:element ref="Role" />
    </xs:sequence>
  </xs:complexType>
</xs:element>

<xs:element name="Role">
  <xs:complexType>
    <xs:sequence maxOccurs="unbounded">
      <xs:element ref="Filters" />
    </xs:sequence>
  </xs:complexType>
</xs:element>
```

```

</xs:sequence>
<xs:attribute name="name" use="required" type="xs:string" />
<xs:attribute name="preSelectedType" use="optional" type="xs:string" />
</xs:complexType>
</xs:element>

<xs:element name="Filters">
<xs:complexType>
<xs:sequence maxOccurs="unbounded">
<xs:choice>
<xs:element ref="TopArtefacts" />
<xs:element name="TopDeltaArtefacts" type="top-artefacts" />
<xs:element name="TopNewArtefacts" type="top-artefacts" />
</xs:choice>
</xs:sequence>
<xs:attribute name="type" use="required" type="xs:string" />
</xs:complexType>
</xs:element>

<xs:element name="TopArtefacts">
<xs:complexType>
<xs:sequence maxOccurs="unbounded">
<xs:choice>
<xs:element minOccurs="0" maxOccurs="unbounded" ref="Column" />
<xs:element minOccurs="0" maxOccurs="unbounded" ref="Where" />
<xs:element minOccurs="0" maxOccurs="unbounded" ref="OrderBy" />
</xs:choice>
</xs:sequence>
<xs:attribute name="id" use="required" type="id" />
<xs:attribute name="name" use="optional" type="xs:string" />
<xs:attribute name="artefactTypes" use="optional" type="xs:string" />
<xs:attribute name="excludingTypes" use="optional" type="xs:string" />
<xs:attribute name="measureId" use="optional" default="LEVEL" type="measure-
id" />
<xs:attribute name="order" use="optional" default="ASC" type="top-order" />
<xs:attribute name="altMeasureId" use="optional" type="measure-id" />
<xs:attribute name="altOrder" use="optional" type="top-order" />
<xs:attribute name="resultSize" use="required" type="result-size" />
</xs:complexType>
</xs:element>

<xs:element name="Column">
<xs:complexType>
<xs:attribute name="measureId" use="optional" type="measure-id" />
<xs:attribute name="infoId" use="optional" type="info-id" />
<xs:attribute name="indicatorId" use="optional" type="indicator-id" />
<xs:attribute name="artefactTypes" use="optional" type="xs:string" />
<xs:attribute name="excludingTypes" use="optional" type="xs:string" />
<xs:attribute name="headerDisplayType" use="optional" default="NAME"
type="header-display-type" />
<xs:attribute name="displayType" use="optional" default="VALUE" type="display-
type" />
<xs:attribute name="decimals" use="optional" default="2" type="xs:integer" />
<xs:attribute name="dateStyle" use="optional" default="DEFAULT" type="date-
style" />
<xs:attribute name="timeStyle" use="optional" default="DEFAULT" type="date-
style" />
<xs:attribute name="datePattern" use="optional" type="xs:string" />
<xs:attribute name="suffix" use="optional" type="xs:string" />

```

```

    <xs:attribute name="useBackgroundColor" use="optional" type="xs:boolean" />
  </xs:complexType>
</xs:element>

<xs:element name="Where">
  <xs:complexType>
    <xs:attribute name="measureId" use="optional" type="measure-id" />
    <xs:attribute name="infoId" use="optional" type="info-id" />
    <xs:attribute name="value" use="optional" type="xs:string" />
    <xs:attribute name="bounds" use="optional" type="bounds-type" />
  </xs:complexType>
</xs:element>

<xs:element name="OrderBy">
  <xs:complexType>
    <xs:attribute name="measureId" use="required" type="measure-id" />
    <xs:attribute name="order" use="optional" default="ASC" type="top-order" />
  </xs:complexType>
</xs:element>

<xs:complexType name="top-artefacts">
  <xs:sequence maxOccurs="unbounded">
    <xs:choice>
      <xs:element minOccurs="0" maxOccurs="unbounded" ref="Column" />
      <xs:element minOccurs="0" maxOccurs="unbounded" ref="Where" />
      <xs:element minOccurs="0" maxOccurs="unbounded" ref="OrderBy" />
    </xs:choice>
  </xs:sequence>
  <xs:attribute name="id" use="required" type="id" />
  <xs:attribute name="name" use="optional" type="xs:string" />
  <xs:attribute name="artefactTypes" use="optional" type="xs:string" />
  <xs:attribute name="excludingTypes" use="optional" type="xs:string" />
  <xs:attribute name="measureId" use="optional" default="LEVEL" type="measure-
id" />
  <xs:attribute name="order" use="optional" default="ASC" type="top-order" />
  <xs:attribute name="resultSize" use="required" type="result-size" />
</xs:complexType>
</xs:schema>

```

Download properties.xsd [../shared_manual/properties.xsd]

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified">

  <xs:simpleType name="id">
    <xs:restriction base="xs:string">
      <xs:pattern value="[A-Z_][A-Z0-9_]+" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="list-id">
    <xs:restriction base="xs:string">
      <xs:pattern value="[A-Z_][A-Z0-9_]+(;[A-Z_][A-Z0-9_]+)*" />
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="elements">
    <xs:sequence>

```

```

<xs:choice minOccurs="0" maxOccurs="unbounded">
  <xs:element ref="package" />
  <xs:element ref="hideMeasure" />
  <xs:element ref="findingsTab" />
  <xs:element ref="actionItemsTab" />
  <xs:element ref="rulesEdition" />
</xs:choice>
</xs:sequence>
</xs:complexType>

<xs:element name="bundle" type="elements" />
<xs:element name="package" type="elements" />

<xs:element name="hideMeasure">
  <xs:complexType>
    <xs:attribute name="path" use="required" />
    <xs:attribute name="targetArtefactTypes" type="list-id" />
  </xs:complexType>
</xs:element>

<xs:element name="findingsTab">
  <xs:complexType>
    <xs:attribute name="orderBy" type="list-id" />
    <xs:attribute name="hideColumns" type="list-id" />
    <xs:attribute name="hideCharacteristicsFilter" type="xs:boolean" />
  </xs:complexType>
</xs:element>

<xs:element name="actionItemsTab">
  <xs:complexType>
    <xs:attribute name="orderBy" type="list-id" />
    <xs:attribute name="hideColumns" type="list-id" />
  </xs:complexType>
</xs:element>

<xs:element name="rulesEdition">
  <xs:complexType>
    <xs:attribute name="scales" use="required" type="list-id" />
  </xs:complexType>
</xs:element>
</xs:schema>

```

Download tutorials.xsd [../shared_manual/tutorials.xsd]

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">

  <xs:simpleType name="external-id">
    <xs:restriction base="xs:string">
      <xs:pattern value="[A-Z]{1}[A-Z0-9_]*" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="positive-integer">
    <xs:restriction base="xs:string">
      <xs:pattern value="[0-9]+" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="opacity">

```

```
<xs:restriction base="xs:string">
  <xs:pattern value="(0|1){1}\.?[0-9]{0,2}' />
</xs:restriction>
</xs:simpleType>

<xs:simpleType name="actions">
  <xs:restriction base="xs:string">
    <xs:enumeration value="EXPAND_PORTFOLIO_TREE" />
    <xs:enumeration value="EXPAND_ARTEFACT_TREE" />
    <xs:enumeration value="EXPAND_MEASURE_TREE" />
    <xs:enumeration value="COLLAPSE_PORTFOLIO_TREE" />
    <xs:enumeration value="COLLAPSE_ARTEFACT_TREE" />
    <xs:enumeration value="COLLAPSE_MEASURE_TREE" />
    <xs:enumeration value="SELECT_MODEL" />
    <xs:enumeration value="SELECT_PROJECT" />
    <xs:enumeration value="SELECT_ARTEFACT" />
    <xs:enumeration value="SELECT_ARTEFACT_LEAF" />
    <xs:enumeration value="CLOSE_MEASURE_POPUP" />
    <xs:enumeration value="SELECT_MEASURE" />
    <xs:enumeration value="SHOW_REVIEW_SET" />
    <xs:enumeration value="SHOW_PORTFOLIO_TREE" />
    <xs:enumeration value="SHOW_DASHBOARD_TAB" />
    <xs:enumeration value="SHOW_ACTION_ITEMS_TAB" />
    <xs:enumeration value="SHOW_HIGHLIGHTS_TAB" />
    <xs:enumeration value="SHOW_FINDINGS_TAB" />
    <xs:enumeration value="SHOW_REPORTS_TAB" />
    <xs:enumeration value="SHOW_FORMS_TAB" />
    <xs:enumeration value="SHOW_INDICATORS_TAB" />
    <xs:enumeration value="SHOW_MEASURES_TAB" />
    <xs:enumeration value="SHOW_COMMENTS_TAB" />
    <xs:enumeration value="SHOW_ACTION_ITEMS_ADVANCED_SEARCH" />
    <xs:enumeration value="EXPAND_ACTION_ITEM" />
    <xs:enumeration value="SHOW_FINDINGS_ADVANCED_SEARCH" />
    <xs:enumeration value="SELECT_FINDING" />
    <xs:enumeration value="SELECT_FINDING_ARTEFACT" />
    <xs:enumeration value="EXPAND_FINDING" />
    <xs:enumeration value="EXPAND_ATTRIBUTE" />
    <xs:enumeration value="SWITCH_INDICATORS_PAGE" />
    <xs:enumeration value="SWITCH_MEASURES_PAGE" />
    <xs:enumeration value="SWITCH_COMMENTS_PAGE" />
    <xs:enumeration value="CLOSE_CHART_POPUP" />
    <xs:enumeration value="OPEN_CHART_POPUP" />
    <xs:enumeration value="OPEN_MODEL_CHART_POPUP" />
    <xs:enumeration value="SELECT_DESCR_TAB" />
    <xs:enumeration value="SELECT_COMMENTS_TAB" />
    <xs:enumeration value="SELECT_FAVORITES_TAB" />
    <xs:enumeration value="COMPARE_CHART" />
    <xs:enumeration value="QUIT_COMPARATIVE_MODE" />
    <xs:enumeration value="QUIT_FULLDISPLAY_MODE" />
    <xs:enumeration value="CLOSE_ARTEFACT_TREE_FILTER" />
    <xs:enumeration value="SHOW_ARTEFACT_TREE_FILTER" />
    <xs:enumeration value="OPEN_TABLE" />
    <xs:enumeration value="CHANGE_PAGE" />
    <xs:enumeration value="CREATE_NEW_PROJECT" />
    <xs:enumeration value="SELECT_WIZARD" />
    <xs:enumeration value="VALIDATE_WIZARD" />
    <xs:enumeration value="VALIDATE_INFORMATION" />
    <xs:enumeration value="VALIDATE_DP_OPTIONS" />
    <xs:enumeration value="RUN_PROJECT_CREATION" />
  </xs:restriction>
</xs:simpleType>
```

```
<xs:enumeration value="OPEN_SUB_MENU_HELP" />
<xs:enumeration value="CLOSE_TUTORIAL_POPUP" />
<xs:enumeration value="OPEN_TUTORIAL_POPUP" />
<xs:enumeration value="NONE" />
</xs:restriction>
</xs:simpleType>

<xs:simpleType name="alias">
<xs:restriction base="xs:string">
<xs:enumeration value="CUSTOM" />
<xs:enumeration value="BODY" />
<xs:enumeration value="BREADCRUMBS" />
<xs:enumeration value="MENU_HELP" />
<xs:enumeration value="SUB_MENU_HELP" />
<xs:enumeration value="SUB_MENU_HELP_ROW" />
<xs:enumeration value="SUB_MENU_HELP_ROW_FIRST" />
<xs:enumeration value="TUTORIAL_POPUP" />
<xs:enumeration value="TUTORIAL_POPUP_MODEL" />
<xs:enumeration value="TUTORIAL_POPUP_MODEL_FIRST" />
<xs:enumeration value="TUTORIAL_POPUP_TUTORIAL_NAME" />
<xs:enumeration value="TUTORIAL_POPUP_TUTORIAL_NAME_FIRST" />
<xs:enumeration value="TUTORIAL_POPUP_TUTORIAL_DESCR" />
<xs:enumeration value="TUTORIAL_POPUP_TUTORIAL_DESCR_FIRST" />
<xs:enumeration value="EXPLORER" />
<xs:enumeration value="DRILLDOWN" />
<xs:enumeration value="EXPLORER_TAB" />
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```

```
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```



```

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```

```
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  </xs:restriction>
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    <xs:enumeration value="gray" />
    <xs:enumeration value="lime" />
    <xs:enumeration value="green" />
    <xs:enumeration value="maroon" />
    <xs:enumeration value="navy" />
    <xs:enumeration value="olive" />
    <xs:enumeration value="orange" />
    <xs:enumeration value="purple" />
    <xs:enumeration value="red" />
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    <xs:enumeration value="teal" />
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</xs:union>
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    <xs:enumeration value="LEFT" />
    <xs:enumeration value="RIGHT" />
    <xs:enumeration value="TOP" />
    <xs:enumeration value="BOTTOM" />
  </xs:restriction>
</xs:simpleType>

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    <xs:enumeration value="SEQUENTIAL" />
    <xs:enumeration value="FREE" />
  </xs:restriction>
</xs:simpleType>

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    <xs:element ref="help"/>
  </xs:sequence>
</xs:complexType>

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<xs:element name="item">
```

```

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type="text-positions" />
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type="colors" />
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  <xs:attribute name="textSize" use="optional" default="25" type="positive-
integer" />
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type="xs:boolean" />
  </xs:complexType>
</xs:element>

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    </xs:sequence>
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type" />
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type="text-positions" />
    <xs:attribute name="textSize" use="optional" default="25" type="positive-
integer" />
    <xs:attribute name="textColor" use="optional" default="white" type="colors" />
    <xs:attribute name="maskColor" use="optional" default="#2aa0d5"
type="colors" />
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>
  </xs:complexType>
</xs:element>

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        <xs:element ref="item" />
      </xs:choice>
    </xs:sequence>
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    <xs:attribute name="opacity" use="optional" default="0.4" type="opacity" />

```

```

    <xs:attribute name="textPosition" use="optional" default="EXTERNAL"
    type="text-positions" />
    <xs:attribute name="textSize" use="optional" default="25" type="positive-
    integer" />
    <xs:attribute name="textColor" use="optional" default="white" type="colors" />
    <xs:attribute name="maskColor" use="optional" default="#2aa0d5"
    type="colors" />
    <xs:attribute name="maskOpacity" use="optional" default="0.6" type="opacity" /
  >
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    <xs:attribute name="icon" use="optional" type="xs:string" />
  </xs:complexType>
</xs:element>
</xs:schema>

```

Download wizards.xsd [../shared_manual/wizards.xsd]

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified">

  <xs:simpleType name="id">
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    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="list-id">
    <xs:restriction base="xs:string">
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    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="alignment">
    <xs:restriction base="id">
      <xs:enumeration value="LEFT" />
      <xs:enumeration value="RIGHT" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="project-status">
    <xs:restriction base="id">
      <xs:enumeration value="IGNORE" />
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    </xs:restriction>
  </xs:simpleType>

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          <xs:element ref="wizard"/>
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  </xs:element>

  <xs:element name="tags">

```

```

<xs:complexType>
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  <xs:attribute name="valueAlign" type="alignment"/>
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</xs:element>

<xs:element name="tag">
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    <xs:sequence>
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    </xs:sequence>
    <xs:attribute name="defaultValue"/>
    <xs:attribute name="displayType"/> <!-- Not display-type because it is case
insensitive -->
    <xs:attribute name="group"/>
    <xs:attribute name="groupId" type="id"/>
    <xs:attribute name="measureId" use="required" type="id"/>
    <xs:attribute name="name"/>
    <xs:attribute name="placeholder"/>
    <xs:attribute name="required" type="xs:boolean"/>
    <xs:attribute name="review" type="xs:boolean"/>
    <xs:attribute name="suffix"/>
    <xs:attribute name="targetArtefactTypes" type="list-id"/>
    <xs:attribute name="textAlign" type="alignment"/>
    <xs:attribute name="type" use="required"/> <!-- Not tag-type because it is
case insensitive -->
    <xs:attribute name="valueAlign" type="alignment"/>
  </xs:complexType>
</xs:element>

<xs:element name="value">
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    <xs:attribute name="key" use="required"/>
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</xs:element>

<xs:element name="wizard">
  <xs:complexType>
    <xs:sequence>
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        <xs:element ref="tags"/>
        <xs:element ref="milestones"/>
        <xs:element ref="repositories"/>
        <xs:element ref="tools"/>
      </xs:choice>
    </xs:sequence>
    <xs:attribute name="autoBaseline" type="xs:boolean"/>
    <xs:attribute name="group"/>
    <xs:attribute name="groups"/>
    <xs:attribute name="hideRulesEdition" type="xs:boolean"/>
    <xs:attribute name="img"/>
    <xs:attribute name="users"/>
    <xs:attribute name="versionPattern"/>
    <xs:attribute name="wizardId" use="required" type="id"/>
    <xs:attribute name="projectsSelection" type="xs:boolean"/>
  </xs:complexType>
</xs:element>
    
```

```
<xs:attribute name="name" />
</xs:complexType>
</xs:element>

<xs:element name="milestones">
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      <xs:element minOccurs="0" maxOccurs="unbounded" ref="milestone" />
    </xs:sequence>
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    <xs:attribute name="canCreateGoal" type="xs:boolean" />
    <xs:attribute name="hide" type="xs:boolean" />
  </xs:complexType>
</xs:element>

<xs:element name="goals">
  <xs:complexType>
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      <xs:element ref="goal" />
    </xs:sequence>
    <xs:attribute name="displayableFamilies" use="required" type="list-id" />
  </xs:complexType>
</xs:element>

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  </xs:complexType>
</xs:element>

<xs:element name="milestone">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="defaultGoal" />
    </xs:sequence>
    <xs:attribute name="id" use="required" type="id" />
    <xs:attribute name="mandatory" type="xs:boolean" />
  </xs:complexType>
</xs:element>

<xs:element name="defaultGoal">
  <xs:complexType>
    <xs:attribute name="measureId" use="required" type="id" />
    <xs:attribute name="value" use="required" type="xs:integer" />
  </xs:complexType>
</xs:element>

<xs:element name="repositories">
  <xs:complexType>
    <xs:sequence>
      <xs:element minOccurs="0" maxOccurs="unbounded" ref="repository" />
    </xs:sequence>
    <xs:attribute name="all" use="required" type="xs:boolean" />
    <xs:attribute name="hide" use="required" type="xs:boolean" />
  </xs:complexType>
</xs:element>
```

```
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    </xs:sequence>
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    <xs:attribute name="name" use="required"/>
  </xs:complexType>
</xs:element>

<xs:element name="tools">
  <xs:complexType>
    <xs:sequence>
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    </xs:sequence>
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    <xs:attribute name="expandedInUI" type="xs:boolean"/>
  </xs:complexType>
</xs:element>

<xs:element name="tool">
  <xs:complexType>
    <xs:sequence>
      <xs:element minOccurs="0" maxOccurs="unbounded" ref="param"/>
    </xs:sequence>
    <xs:attribute name="checkedInUI" type="xs:boolean"/>
    <xs:attribute name="expandedInUI" type="xs:boolean"/>
    <xs:attribute name="name" use="required"/>
    <xs:attribute name="optional" type="xs:boolean"/>
    <xs:attribute name="projectStatusOnFailure" type="project-status"/>
    <xs:attribute name="projectStatusOnWarning" type="project-status"/>
  </xs:complexType>
</xs:element>

<xs:element name="param">
  <xs:complexType>
    <xs:attribute name="availableChoices"/>
    <xs:attribute name="name" use="required"/>
    <xs:attribute name="value"/>
    <xs:attribute name="hide" type="xs:boolean"/>
  </xs:complexType>
</xs:element>
</xs:schema>
```

Appendix C. Licences

Squoring Software

End-User License and Support Agreement

Please read this document carefully. This is a legal agreement by which Squoring Technologies SAS ("Squoring") permits use of its Software products ("Squoring Software"). The user ("Customer") accepts the terms of this Agreement by taking any or all of the following actions: (a) by signing an order form or purchase order referencing either this Agreement or a Technical and Financial proposal issued by Squoring (an "Order Form"), (b) by opening the package containing the Software, and/or (c) by installing the Software on a computer ("Target Hardware").

CUSTOMER CONSENTS TO BE LEGALLY BOUND BY THESE TERMS. IF CUSTOMER DOES NOT AGREE TO ALL OF THE TERMS OF THIS AGREEMENT, CUSTOMER MUST NOT USE THE SOFTWARE AND MUST RETURN IT, INCLUDING ANY PRINTED ASSOCIATED DOCUMENTATION, TO SQUORING WITHIN FOURTEEN (14) DAYS TO RECEIVE A FULL REFUND OF THE PURCHASE PRICE.

1) DEFINITION

- (a) "Squoring Software" includes (i) the Software identified in an Order Form or delivered with this Agreement; (ii) any authorized copies thereof; (iii) all related documentation ("Documentation") delivered with or included in that software; and (iv) any update to that software that Customer may receive from Squoring.
- (b) Squoring Software is based on a traditional 3-tier architecture consisting of:
- . a database and a data folder for storing project and user management data
 - . an application server running the "Squore Server Software" and the "License Server Software"
 - . a client front-end accessible through a Web Browser and a Command Line Interface to interact with the application server from a client machine
- (c) Target hardware ("Target Hardware") is uniquely identified by the hardware specification and the operating system running on it.

2) LICENSE

Squoring grants to Customer, and Customer accepts from Squoring, a non-exclusive and non-transferable right and license to use the Squoring Software that is specified in the Order Form and/or that accompanies this Agreement, but only (i) in accordance with the related Documentation, (ii) subject to Customer's payment of applicable license fees and (iii) subject to the terms and conditions specified below.

Customer agrees that Customer does not have, and does not hereby acquire, any title or rights of ownership in any Squoring Software or, except for the license rights hereby granted, any right to use, copy, transfer or disclose all or any portion of any Squoring Software. The Squoring Software is protected by copyright laws and international treaties.

3) FEES

The fees for the license under this Agreement are set forth in the applicable Order Form or, if no Order Form exists, in the applicable Technical and Financial proposal issued by Squoring, or, if no proposal exists, then in accordance with Squoring current list prices.

4) USE

- (a) Unless otherwise stated in a special agreement, all dissemination or commercial exploitation of Squoring Software results is strictly forbidden.
- (b) The license granted by this Agreement is a license under which a maximum number of active users and projects specified in the Order Form may use the Squoring Software. An "Active User" is a physical user registered in the Squoring Software database. Active Users are not shared among several Squoring software databases. A user is active if any activity has been recorded by the Squore Server Software in the past 6 months. Activities include remote project creation, viewing of analysis results, and e-mail notification.
- (c) The management and regulation of Active Users is managed by the License Server Software hosted on the Target hardware designated by the Customer.
- (d) Except for continuous integration purpose, it is strictly forbidden to share the same Squoring Software login between different physical users.
- (e) Customer will ensure that at least one of its employees has completed the two days on-site training course "Administrating Squoring software" given by a Squoring Software certified trainer, and that such trained employee(s) are the people within Customer's organization who are responsible for interactions with Squoring on maintenance and support matters.
- (f) Customer may make a reasonable number of back-up or archival copies of the Software. Customer will reproduce all confidentiality and proprietary notices on each of these copies and maintain an accurate record of the location of each of these copies.
- (g) Customer will not:
 - . Reverse compile, disassemble, or otherwise reverse engineer any Squoring Software, or allow anyone else to do so (except only to the extent such prohibition is contrary to applicable law).
 - . Remove or destroy any proprietary markings or legends or any encrypted license keys or similar security devices placed upon or contained in any Squoring Software.
 - . Modify or adapt the Squoring Software or create a derivative work based on or incorporate the Squoring Software into or with other software.
 - . Unless otherwise stated in a special agreement, distribute, sublicense, share, display, or in any manner make the Squoring Software available to any third party, with or without compensation.
 - . Use all or any part of the Squoring Software to create other software a principal purpose of which is to perform the same or similar functions as, or to replace any component of, the Squoring Software.

5. MAINTENANCE AND SUPPORT

- (a) Depending on the type of licenses bought by the Customer, Squoring will provide support and maintenance services according to the following schedule:
 - i. In case of perpetual licenses bought by Customer
 - . Maintenance fees will be charged in addition to the price of the purchase of the Squoring Software licenses. The annual initial amount of maintenance fees will be calculated on the basis of a 20% percentage of the net list price of the software licenses purchased by the Customer.
 - . After one year, Maintenance and Support services will be renewed by tacit agreement of the parties, for annual periods. Before the anniversary date of each license for which Support Services are in effect, Squoring shall advise the Customer of the applicable Maintenance and Support Service fees for the coming year.
 - . The termination of maintenance contract will be effective only by sending a registered letter with acknowledgement of receipt denouncing the contract at least 60 days before the end of the period of validity.
 - ii. In case of software licenses subscription

If the license to use the software is subject to a periodic subscription, the maintenance cost for these licenses is included in the subscription price. The maintenance is so provided during all the duration of the subscription, and stops automatically at the end of the subscription validity.

(b) Conditions. Maintenance and support services as defined hereafter in paragraph 5-(c) are applicable subject to the following conditions:

- . Squoring Software is covered by a valid maintenance contract for all acquired Squoring software licenses.
- . Squoring Software was not modified by the Customer.
- . The version of the installed Squoring Software corresponds to one of the two latest annual major updates distributed by Squoring Technologies.
- . Customer engages to comply with the normal use of the software, strictly comply with the instructions given by the Squoring Technologies and to respect all provisions in the present agreement.
- . Customer shall nominate from among its staff a technical coordinator and an alternate coordinator at the Customer Site(s), with up to date knowledge of Squoring licensed products usage and sufficient technical knowledge to interact with Squoring support staff. In case of change of the coordinators, the Customer will provide written notification to Squoring Technologies.

(c) Maintenance and support services include:

- . Assistance from support: the online support (hot line) is available during Squoring normal business hours from 9 am to 6 pm (Central European Time) to answer the questions of the technical coordinator when technical facts encountered in the use of the Squoring Software. Support will help to identify problems and provide, where appropriate, temporary fixing patches. Contact information for support is:
 - support site: <https://support.squoring.com>
 - email: support@squoring.com
- . Corrective maintenance: the corrective maintenance includes the development, to the extent commercially reasonable, of workarounds or program fixes for malfunctions submitted by Customer. Are considered as malfunctions recognized or reproducible defects resulting in distorted results compared to those defined in the software Manual and not coming from non-observance of the instructions of the said Manual.
- . Updates: updates include the delivery of successive versions of the software, being either due to bug fixes or to enhancements of performances or features (this delivery does not necessarily provide new additional features). Customer will destroy any prior version before installing a new update.
- . Rehost: any change of "Target hardware" implies a change of license keys and shall be subject to the prior written authorization of Squoring and to the signature by the Customer of a letter of destruction of all the license files already installed.

d) Maintenance and support services do not include:

- . Time spent, after request of the Customer by Squoring Technologies staff not directly attributable to maintenance services: search for non-reproducible anomalies, malfunction due to non-compliance with the Manual without the Software itself being an issue, unavailability of the system, operating activities prior to the intervention (such as preliminary backup ...).
- . Installation of the Software by Squoring Technologies.
- . Additional services which do not fall within the scope of maintenance services as defined above in paragraph 5-(c).
- . On-site support: Squoring may offer on-site support to Customer at additional charges

e) Procedure for the submission of requests:

- . To be taken into account, Customer requests shall be sent using the support site at <https://support.squoring.com>
- . Customer agrees to give, in support of a request for correction due to an anomaly, any information likely to facilitate the search for the causes of this anomaly, and to give for free to Squoring Technologies an open access to its

premises and development stations in the day and hours necessary to perform the contract, and to ensure the conservation, under the conditions of appropriate security and condition of the latest version, of the sources of programs in case of this is necessary to enable Squoring Technologies to perform its maintenance services.

- . Regarding correction of anomalies, Squoring is committed to act as soon as possible to correct the anomalies detected. Squoring will transfer to the Customer either a technique to bypass the anomaly or a patch of necessary corrections or a new version of the software.
- . Any issues not resolved with the initial response will be investigated using the data provided. Below are the targeted response times for continued investigations.
 - Blocker: 1 day, daily update. A request is "blocking" when the incident has a significant impact with a risk of operating loss or when data are corrupted. The significant impact is appreciated by Squoring Technologies.
 - Serious: 2 days, weekly update
 - Major: 3 days, monthly update
 - Minor: 1 week, monthly update
- (f) Limitations
 - . Squoring is expressly subject to an obligation of means.
 - . Squoring is not required to (i) develop and release any, or any particular type of enhancements or (ii) customize the enhancements to satisfy Customer's particular requirements.
 - . The Updates will not include any upgrade or new version of the Products that Squoring decides, in its sole discretion, to make generally available as a separately priced item.
 - . Squoring will be released from any responsibility in case of breach by the Customer of any provision of this maintenance terms and conditions.

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- (a) Limited Warranty. Squoring warrants that it has the right to (i) enter into this Agreement and (ii) grant the licenses hereunder. Squoring also warrants that the Squoring Software will perform substantially as described in the Documentation during a 90 days Warranty Period. Customer acknowledges that (i) the Products may not satisfy all of Customer's requirements and (ii) the use of the Products may not be uninterrupted or error-free.
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be or has been asserted, Customer will permit Squoring, at Squoring option and expense, to (A) procure the right to continue using the Product, (B) replace or modify the Product to eliminate the infringement while providing functionally equivalent performance, or (C) accept the return of the Product and refund to Customer the License Fee actually paid to Squoring for such Product, less depreciation based on a 5-year straight-line-depreciation schedule.

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Agreement. Customer acknowledges that any unauthorized use or disclosure of the Products may cause irreparable damage to Squoring. If an unauthorized use or disclosure occurs, Customer will immediately notify Squoring and take, at Customer's expense, all steps which may be available to recover the Products and to prevent their subsequent unauthorized use or dissemination. Squoring agrees to take the same action regarding any information designated in writing as proprietary which it receives from Customer ("Customer Information").

(c) Limitation. Neither Squoring nor Customer will have any confidentiality obligation with respect to any portion of the Products or Customer Information that (i) the receiving party knew or independently developed before receiving such Products or Customer Information under this Agreement, (ii) the receiving party lawfully obtained from a third party under no confidentiality obligation, or (iii) became available to the public other than as a result of any act or omission by the receiving party or any of receiving party's employees or consultants.

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Customer may terminate this Agreement or any Order Form, without right to refund, by notifying Squoring of such termination and returning the Product and copies thereof to Squoring. Squoring may terminate this Agreement, upon reasonable notice and without judicial or administrative resolution, if Customer or any of Customer's employees or consultants breach any material term or condition hereof. This Agreement will terminate automatically if Customer becomes insolvent or enters into bankruptcy, suspension of payments, moratorium, or any other proceeding that relates to insolvency or protection or creditors' rights.

Upon the termination of this Agreement for any reason, all rights granted to Customer hereunder will cease, and Customer will stop using Squoring Software, return or destroy all copies and so certify to Squoring in writing. The provisions of Sections 6-8 will survive the termination of this Agreement.

11. INSPECTION

During the term of this Agreement, Squoring or its representative, if in receipt of credible evidence of non-compliance, may, upon prior notice to Customer, inspect the files, computer processors, equipment and facilities of Customer during normal working hours to verify Customer's compliance with this Agreement. While conducting such inspection, Squoring or its representative will be entitled to copy any item that Customer may possess in violation of this Agreement, without disruption of Squoring business and violation of Laws and Regulations.

12. ASSIGNMENT

Customer shall not assign, delegate or otherwise transfer this Agreement or any of its rights or obligations hereunder without Squoring prior approval which shall not be unreasonably withheld.

13. MISCELLANEOUS

. Any terms and conditions of any unilateral letter, memorandum, purchase order or other writing issued by Customer shall not be binding on Squoring. Any waiver or modification of this Agreement will not be effective unless executed in writing and signed by an authorized representative of Squoring and Customer. This Agreement will bind Customer's successors-in-interest.

. This Agreement will be governed by and interpreted in accordance with the laws of France. If any provision of this Agreement is held to be unenforceable, in whole or in part, such holding will not affect the validity of the other

provisions of this Agreement, unless the Parties in good faith deem the unenforceable provision to be essential, in which case either Party may terminate this Agreement effective immediately upon notice to the other Party. This Agreement constitutes the complete and entire statement of all conditions and representations of the agreement between Squoring and Customer with respect to its subject matter and supersedes all prior writings or understandings.

Redistributed Software	Version	License File

Wildfly	10.1.0.Final	lgpl-2.1.txt
PostgreSQL	8.4	postgresql-bsd.txt
Perl	5.12.3	al.txt
TCL	8.5	tcltkl.txt,tcllib.txt
PhantomJS	2.1.1	bsd3.txt
Components	Sub component	Version License File

Richfaces	4.5.17	lgpl-2.1.txt
PostgreSQL JDBC Driver	42.0.0	bsd2.txt
Oracle JDBC driver	12.1.02	otn.txt
Omnifaces	2.6	apache-2.0.txt
ANTLR	3.1	antlr3.txt
JasperReports Library	4.8	lgpl-2.1.txt
Checkstyle	5.6	lgpl-2.1.txt
JTcl	2.8	jtcl.txt, amd.txt, itcl.txt, janino.txt, tcllib.txt, tcltk.txt, ucb.txt
log4j	1.2.17	apache-2.0.txt
Apache Commons	commons-lang3 3.1	apache-2.0.txt
Apache HttpComponents	httpclient 4.1.2	apache-2.0.txt
Apache HttpComponents	httpmime 4.1.2	apache-2.0.txt
Apache XML Graphics	batik-transcoder 1.7	apache-2.0.txt
Bouncy Castle	bcmail-jdk16 1.46	bouncy-castle.txt
com.beust	jcommander 1.48	apache-2.0.txt
com.google.collections	google-collections 1.0	apache-2.0.txt
com.googlecode.juniversalchardet	juniversalchardet 1.0.3	mpl1.1.txt
com.sun.mail	javax.mail 1.5.3	gf.txt
commons-cli	commons-cli 1.2	apache-2.0.txt
commons-collections	commons-collections 3.2.2	apache-2.0.txt
javax.enterprise	cdi-api 1.2	apache-2.0.txt
javax.validation	validation-api 1.1.0.Final	apache-2.0.txt
net.java.dev.jna	jna 4.1.0	lgpl-2.1.txt
net.sf.jsci	jsci 1.2	lgpl-2.1.txt
net.sf.saxon	saxon-xom 8.7	mpl1.0.txt
nux	nux 1.6	nux.txt
org.glassfish	javax.json 1.0.4	gf.txt
org.jdom	jdom2 2.0.5	jdom.txt
Resources	Version	License File

CodeMirror	4.4.0	mit.txt
font-awesome	4.7.0	mit.txt, ofl-1.1.txt
JavaScript InfoVis Toolkit	2.0.1	mit.txt
jquery	1.12.3	jquery.txt
jquery-mobile	1.4.2	jquery-mobile.txt
jquery-ui-resizable	1.11.4	mit.txt, jquery.txt
notify.js	0.4.2	mit.txt
splitter.js	1.51	mit.txt
gridstack.js	1.0.0	mit.txt
spectrum.js	1.8.0	mit.txt

al

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The End

amd

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antlr3

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apache-2.0

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GlassFish

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lgpl-2.1

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