

The primary goal of this dissertation is development of an extensible web-based workbench for collaborative software architecting and a graphical tool, added to the workbench, for modeling of software architecture based on the 4+1 architectural view model.

1. Development of a workbench for software architecting providing the following functionalities:
  - Adaptability to the user - recognition of the user, after login, and presentation of the projects related to them.
  - After login, the user will be able to make a new project and select the tool with which to amend it.
  - Support for collaborative work:
    - after login, the user will be able to add collaborators to a project from their project's list.
    - when using the design tool and if working in collaboration the user will be able to see the amendments made to the project by the other collaborators, given they use the same view.
  - Saving and loading of the data – support for iterative architecting.
  - Extensibility – facilitation of easy programmatic addition of menus and menu items to the workbench.
2. Development of a plug-in graphical tool for modeling of software architecture and addition of the tool to the workbench. The tool will provide the following capabilities:
  - Generation of a graphical model of the designed architecture based on the 4+1 architectural view model.
  - Generation of XML file representing the generated architectural model.
  - Extensibility – facilitation of easy programmatic addition of views, entities, and relations to the design tool.
3. Build a case study used for evaluation of the developed software.

1. Addition of the following functionality to the workbench:
  - Support for collaborative work – addition of chat functionality.
  - Customization of the working environment.

- Development of rules for validation of each generated view.
- Development of, integrated into the design tool, tool for analysis of the generated design.
- Extensibility – facilitation of easy programmatic addition of custom rules to the integrated analysis tool.

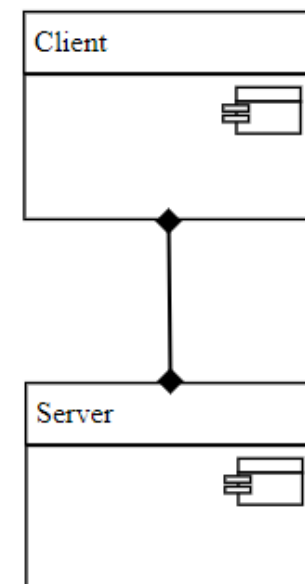
- Addition of functionality for downloading of the XML file representing a given view and, after upload, merging it with the same view belonging to another project.

- Development of a plug-in tool for validation to the uploaded XML file, representing a given view, used before merge of two views.

The screenshot displays the SA Workbench software interface, which is used for creating and managing logical architectures. The main workspace shows a logical architecture diagram with various components and their interconnections.

**Interface Elements:**

- Top Bar:** Includes the SA Workbench logo, menu options (File, Edit, View, Help), a user profile (per7@st-andrews.ac.uk), and a Log out button.
- Left Panel:** Contains a 'Logical View' section with a grid of icons for different components and a 'Process View' section with a grid of icons for different processes.
- Main Workspace:** Displays a logical architecture diagram. The diagram includes components like MongoDB, Mongoose, Node.js, Express.js, Socket.io, Web browser, SA Workbench, Warnings, Window popup, Analyser, iQuery, Snap SVG, and Socket.io. The components are connected by lines representing data flow or dependencies.
- Right Panel:** Contains a 'Warnings' section with a list of warnings (e.g., '1. Entity with GroupID gSj6dbpcz01 is not connected.') and a 'Properties' section with a table of properties.
- Bottom Right:** A user interface window titled 'roc5@st-andrews.ac.uk' is visible, showing a 'Logical view' and a 'Adding user ...' dialog box.



```
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</svg>
```

The screenshot displays two overlapping windows from the SA Workbench application. The background window is the 'New Project' dialog, which has a title bar with the 'SA Workbench' logo and name. It contains a table with three rows of project information. The first row is for 'SA Workbench Architecture', the second for 'SA Workbench 2', and the third for 'SA Workbench 3'. The third row is highlighted in blue. To the right of the table are two buttons: 'Add User to This Project' and 'Load Project'. Below the table, there is a text area containing project details: 'Project name: SA Workbench Architecture', 'Project description: Development of the SA Workbench architecture', and 'Project collaboration: you'll get answers to do, not you'll get answers to ask'. The foreground window is the 'Add User' dialog, which has a title bar with a close button. It contains the text 'User email' and a text input field with the placeholder 'Add User by email'. At the bottom are two buttons: 'Cancel' and 'Add User'.

| Name | SA Workbench Architecture | Add User to This Project | Load Project |
|------|---------------------------|--------------------------|--------------|
| Name | SA Workbench 2            | Add User to This Project | Load Project |
| Name | SA Workbench 3            | Add User to This Project | Load Project |
| Name | A new test project        | Add User to This Project | Load Project |

Project name: SA Workbench Architecture  
 Project description: Development of the SA Workbench architecture  
 Project collaboration: you'll get answers to do, not you'll get answers to ask

**Add User**

User email

Add User by email

Cancel Add User

**I think that the ability to add my own views to the design tool is beneficial.**  
5 responses

| Rating | Count | Percentage |
|--------|-------|------------|
| 1      | 0     | 0 (0%)     |
| 2      | 0     | 0 (0%)     |
| 3      | 0     | 0 (0%)     |
| 4      | 1     | 1 (20%)    |
| 5      | 1     | 1 (20%)    |
| 6      | 1     | 1 (20%)    |
| 7      | 2     | 2 (40%)    |

**I find the ability to add my own tools to the SA Workbench useful.**  
5 responses

| Rating | Count | Percentage |
|--------|-------|------------|
| 1      | 0     | 0 (0%)     |
| 2      | 1     | 1 (20%)    |
| 3      | 0     | 0 (0%)     |
| 4      | 1     | 1 (20%)    |
| 5      | 1     | 1 (20%)    |
| 6      | 0     | 0 (0%)     |
| 7      | 2     | 2 (40%)    |

**I do not find that the collaborative development of software architecture designs has a positive effect on the produced designs.**  
5 responses

| Rating | Count | Percentage |
|--------|-------|------------|
| 1      | 2     | 2 (40%)    |
| 2      | 2     | 2 (40%)    |
| 3      | 0     | 0 (0%)     |
| 4      | 1     | 1 (20%)    |
| 5      | 0     | 0 (0%)     |
| 6      | 0     | 0 (0%)     |
| 7      | 0     | 0 (0%)     |

**I consider the lack of need for software installation to be advantageous.**  
5 responses

| Rating | Count | Percentage |
|--------|-------|------------|
| 1      | 0     | 0 (0%)     |
| 2      | 0     | 0 (0%)     |
| 3      | 0     | 0 (0%)     |
| 4      | 0     | 0 (0%)     |
| 5      | 1     | 1 (20%)    |
| 6      | 2     | 2 (40%)    |
| 7      | 2     | 2 (40%)    |

**I am satisfied with the account setup experience of this software.**  
5 responses

| Rating | Count | Percentage |
|--------|-------|------------|
| 1      | 1     | 1 (20%)    |
| 2      | 0     | 0 (0%)     |
| 3      | 0     | 0 (0%)     |
| 4      | 1     | 1 (20%)    |
| 5      | 2     | 2 (40%)    |
| 6      | 0     | 0 (0%)     |
| 7      | 1     | 1 (20%)    |

**I am satisfied with the look and feel of this software.**  
5 responses

| Rating | Count | Percentage |
|--------|-------|------------|
| 1      | 0     | 0 (0%)     |
| 2      | 0     | 0 (0%)     |
| 3      | 0     | 0 (0%)     |
| 4      | 1     | 1 (20%)    |
| 5      | 3     | 3 (60%)    |
| 6      | 1     | 1 (20%)    |
| 7      | 0     | 0 (0%)     |

Java: Maven (2.1.0/76548)

File Edit Search Run Options Help

Test Plan Group 1 DA Workbench Internship New Results in Table Graph Results Performance

### Graph Results

Name: Graph Results

Comments:

Show Results in Table ☒ Graph Results ☒ Performance

Filename:

Graphs to Display: ☒ Data ☒ Average ☒ Median ☒ Deviation ☒ Throughput

☐ Log Display Only ☐ Errors ☐ Successes

4270 ms

0 min 10 min

No. of Samples: 1205

Deviation: 2015

Latest Sample: 125

Throughput: 6.332.000/min

Average: 1754

Median: 720

The results from the survey show that the participants are satisfied with the look and feel of the web application and the account setup experience. Additionally, the results suggest that the participants find that the lack of installation need is an advantage, that the collaborative work has a positive effect on the produced designs and that the extensibility of the system is useful. Moreover, most of the users are satisfied with the ease of use of the software.