Project Plan

For GMoDS Visualizer and Test Driver

Version 2.0

Submitted in partial fulfillment of the requirements of the degree of MSE

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1 Introduction
This is the initial project plan for the GMoDS Visualizer and Test Driver Masters of Software Engineering final project.

1.1 References
2. Fraka, Mike, GMoDS Visualizer and Test Driver Project Plan 1.0, [online], available http://people.cis.ksu.edu/~mfraka/Phase1/PlanDocument1.0.pdf.

1.2 Terms
• KSLOC – The size of source code in units of thousands of lines.

2 Project Phases

2.1 Inception Phase
The inception phase includes tasks to prepare a vision document, project plan, software quality assurance plan, develop an initial prototype, and present the inception phase products to the project supervisory committee.

The prototype will demonstrate a user interface for the GMoDS Visualizer that partially implements the use cases “GV-1 Display Specification Tree”, “GV-2 Display Instance Tree”, and “GV-3 Update Instance Tree”. The UI will also demonstrate the manual mode for the GMoDS Test Driver using a hardwired event script.

The inception phase will conclude upon approval of the supervisory committee.

2.2 Elaboration Phase
The elaboration phase includes tasks to revise the vision and project plan documents, develop a formal specification of one aspect of the software, prepare the architectural design document, prepare a test plan, implement an executable architecture prototype, conduct a technical inspection of one elaboration phase artifact, and present elaboration phase products to the supervisory committee.

The executable architecture prototype will demonstrate the architecture of the software on the critical requirements.

The elaboration phase will conclude upon approval of the supervisory committee.

2.3 Production Phase
The production phase includes tasks to prepare the component design document, develop the remaining code and tests, conduct testing, evaluate the project, and present production phase products to the supervisory committee.
The production phase presentation will include the production phase artifacts and a final demonstration of the software.

The production phase will end upon approval of the supervisory committee.

3 Architecture Elaboration Plan

3.1 Revise the Vision Document
The student will incorporate changes suggested by the supervisory committee into the vision document. The revised vision document will be submitted to the major professor for approval.

3.2 Revise the Project Plan
The student will revise the project plan to provide a detailed implementation phase plan and revised cost estimate. The revised project plan will be submitted to the major professor for approval.

3.3 Develop a Formal Specification
The student will formally specify the visibility and appearance of UI elements corresponding to instance goals in response to GMoDS updates and user interactions using USE and OCL. The formal specification will be submitted to the supervisory committee for approval.

3.4 Prepare the Architectural Design Document
The student will prepare an architectural design document to the level of abstraction of component interfaces using appropriate diagrams. The architectural document will undergo technical inspection and be submitted to the supervisory committee for approval.

3.5 Prepare the Test Plan
The student will prepare a test plan for the software to be executed in the production phase. The test plan will include unit, integration, and component- and system-level functional tests.

The plan will include evaluation criteria for all critical use cases and a set of test data deemed adequate for acceptance testing. Specifically, the test plan will identify a set of test cases, the types of tests that will be used for these test cases, the data that will be used for each case, and the requirement traces for each test case [1].

The test plan will be submitted to the supervisory committee for approval.

3.6 Conduct a Technical Inspection
The student will prepare an inspection checklist for the architectural design document and coordinate the inspection with the inspectors. Kyle Hill and Shylaja Chippa will serve as inspectors on this project. The inspection check lists and letters will be submitted to the supervisory committee for approval.
3.7 Implement an Executable Architecture Prototype

The executable prototype will demonstrate the architecture for the critical requirements established in the GMoDS Test Driver use cases “GTD-1 Issue Scripted Goal Events” and “GTD-2 Issue Random Goal Events” and the GMoDS Visualizer use cases “GV-1 Display Specification Tree”, “GV-2 Display Instance Tree”, and “GV-3 Update Instance Tree”. The demonstration and presentation to the supervisory committee will expose the top technical risks in the project.

4 Implementation Plan

4.1 Deliverables

The following deliverables will be provided in the production phase per course requirements [1].

4.1.1 Action Items

Action items identified during Presentation 2 will be resolved and documented.

4.1.2 User Manual

A user manual will be provided. Sections will include an overview and explanations of common usage, user commands, error messages, and data formats.

4.1.3 Component Design

The internal design of the components will be documented consistent with their complexity using class, sequence, and state chart diagrams.

4.1.4 Source Code

Well documented source code will be submitted consistent with the architectural and component designs.

4.1.5 Assessment Evaluation

A test evaluation document will include descriptions of the testing, failures, and reliability estimates. The document will include graphical depiction of software quality metrics.

4.1.6 Project Evaluation

A project review document will review both the process and product. The process review will cover methodologies, cost estimation accuracies, and usefulness of technical reviews. The product review will address whether the system requirements have been achieved and evaluate the quality of the product.

4.1.7 References

The annotated bibliography will include cited references for all notations used in the portfolio.

4.1.8 Formal Technical Inspection Letters

Fellow MSE students Kyle Hill and Shylaja Chippa will provide letters including their formal technical inspection checklist evaluations of this project and stating that the student in question
successfully participated in their MSE project as an inspector and that their projects (or at least their formal technical inspection section) have successfully passed the architecture presentation.

### 4.2 Work Breakdown Structure

<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Task</th>
<th>Completion Criteria</th>
<th>Time Frame</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source code</td>
<td>Draw relations between non-adjacent specification goals.</td>
<td>Executable code.</td>
<td>9-14 Feb</td>
<td>4 days</td>
</tr>
<tr>
<td></td>
<td>Implement parameter origin value (M) “Modification”.</td>
<td>Executable code.</td>
<td>15-17 Feb</td>
<td>3 days</td>
</tr>
<tr>
<td></td>
<td>Revise event error checking.</td>
<td>Executable code.</td>
<td>18 Feb</td>
<td>0.5 day</td>
</tr>
<tr>
<td></td>
<td>Log event script errors</td>
<td>Executable code.</td>
<td>18 Feb</td>
<td>0.5 day</td>
</tr>
<tr>
<td></td>
<td>Visually notify user of event script errors.</td>
<td>Executable code.</td>
<td>22 Feb</td>
<td>1 day</td>
</tr>
<tr>
<td></td>
<td>Confirm overwrite during save event script.</td>
<td>Executable code.</td>
<td>23 Feb</td>
<td>0.25 day</td>
</tr>
<tr>
<td></td>
<td>Edit random event parameters.</td>
<td>Executable code.</td>
<td>23-24 Feb</td>
<td>2 days</td>
</tr>
<tr>
<td></td>
<td>Edit state parameters</td>
<td>Executable code.</td>
<td>25-28 Feb</td>
<td>2 days</td>
</tr>
<tr>
<td></td>
<td>View specification tree parameters.</td>
<td>Executable code.</td>
<td>1 Mar</td>
<td>0.5 day</td>
</tr>
<tr>
<td></td>
<td>View instance tree parameters</td>
<td>Executable code.</td>
<td>1 Mar</td>
<td>0.25 day</td>
</tr>
<tr>
<td></td>
<td>Expand/collapse instance sub-trees.</td>
<td>Executable code.</td>
<td>2 Mar</td>
<td>1 day</td>
</tr>
<tr>
<td></td>
<td>Show/hide specific instance goal parameters.</td>
<td>Executable code.</td>
<td>3 Mar</td>
<td>1 day</td>
</tr>
<tr>
<td></td>
<td>Show/hide all instances of particular specification goals and their descendants.</td>
<td>Executable code.</td>
<td>4-7 Mar</td>
<td>2 days</td>
</tr>
<tr>
<td>Component Design</td>
<td>GMoDS Test Driver Component Design</td>
<td>UML diagrams.</td>
<td>8-9 Mar</td>
<td>1.5 days</td>
</tr>
<tr>
<td>Deliverable</td>
<td>Task</td>
<td>Completion Criteria</td>
<td>Time Frame</td>
<td>Time</td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------------------------------------</td>
<td>---------------------------------------------</td>
<td>-------------</td>
<td>-------</td>
</tr>
<tr>
<td>GMoDS Visualizer</td>
<td>UML diagrams</td>
<td>9-10 Mar</td>
<td>1.5 days</td>
<td></td>
</tr>
<tr>
<td>Component Design</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Testing/Assessment</td>
<td>Develop Unit Tests</td>
<td>Unit tests complete and passed.</td>
<td>11-17 Mar</td>
<td>5 days</td>
</tr>
<tr>
<td>Evaluation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Develop test case inputs</td>
<td>Inputs complete.</td>
<td>18-22 Mar</td>
<td>3 days</td>
</tr>
<tr>
<td></td>
<td>Run manual test cases and resolve issues.</td>
<td>All test cases complete.</td>
<td>23-30 Mar</td>
<td>6 days</td>
</tr>
<tr>
<td></td>
<td>Evaluate quality metrics.</td>
<td>Quality metric graphs complete.</td>
<td>31 Mar</td>
<td>1 day</td>
</tr>
<tr>
<td></td>
<td>Document test results.</td>
<td>All test case documentation complete.</td>
<td>1-4 Apr</td>
<td>2 days</td>
</tr>
<tr>
<td>Action Items</td>
<td>All action item resolutions documented.</td>
<td>All action items resolved and documented.</td>
<td>5 Apr</td>
<td>0.5 day</td>
</tr>
<tr>
<td>User Manual</td>
<td>Installation guide</td>
<td>Approved by Major Professor.</td>
<td>5-6 Apr</td>
<td>1.5 day</td>
</tr>
<tr>
<td></td>
<td>User guide</td>
<td>Approved by Major Professor.</td>
<td>6-7 Apr</td>
<td>1.5 day</td>
</tr>
<tr>
<td>References</td>
<td>All references documented.</td>
<td>Approved by Major Professor.</td>
<td>8 Apr</td>
<td>0.5 day</td>
</tr>
<tr>
<td>Formal Technical</td>
<td>Send and receive letters from formal</td>
<td>Approved by Major Professor.</td>
<td>8 Apr</td>
<td>0.5 day</td>
</tr>
<tr>
<td>Inspection Letters</td>
<td>inspectors.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Evaluation</td>
<td>Evaluate process and product.</td>
<td>Approved by Major Professor.</td>
<td>11-13 Apr</td>
<td>3 days</td>
</tr>
<tr>
<td></td>
<td>Compile all project artifacts into an</td>
<td>Approved by Major Professor.</td>
<td>14 Apr</td>
<td>1 day</td>
</tr>
<tr>
<td></td>
<td>overall portfolio document.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5 Cost Estimate

The project is at the end of the Elaboration Phase (phase 2). Table 1 below lists the productivity for source code and documentation development in phases 1 and 2 of this project.

<table>
<thead>
<tr>
<th>Activity Type</th>
<th>Project Time (hours)</th>
<th>Quantity</th>
<th>Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Code</td>
<td>85.7</td>
<td>5000 SLOC</td>
<td>58.4 SLOC/Hr</td>
</tr>
<tr>
<td>Documentation</td>
<td>68.5</td>
<td>11 Documents</td>
<td>0.16 Doc./Hr</td>
</tr>
<tr>
<td>Reading/Research/Misc.</td>
<td>24.5</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

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I have completed about 51 of 72 (71%) functional requirements by the end of phase 2. I estimate that the total SLOC required for the project near 7000 \( \frac{5000}{0.71} = 7059 \). So approximately 2000 SLOC remain to be written.

I estimate about 36 hours of source code development using the productivity factor of 58.4 SLOC/Hr \( \frac{2059}{58.4} = 35.3 \) hours. Assuming work of 2 hours/day this translates to approximately 18 days.

I estimate that developing unit tests should take approximately 10 hours (5 days), developing manual test inputs 6 hours (3 days), running manual tests with the GMoDS Test Driver 6 hours (3 days), and running manual tests with a simulation 6 hours (3 days) for a total of 14 days.

There are 5 major documents to produce in the Implementation Phase (component design, assessment evaluation, user manual, project evaluation, and references). I estimate this will take 32 hours \( \frac{5}{0.16} = 31.25 \) or 16 days. So the total estimated time for phase 3 is 48 days.

### 5.1 Comparison of Cost Estimates

I initially estimated the code size \([2]\) as 3.3 KSLOC using unadjusted function points. The updated code size estimate more than doubles the initial estimate. This discrepancy may be due to inexperience with function point estimation and with the application area.

I initially made an estimate of the most likely the effort and time required using COCOMO 2.0. The most likely time estimate was 7.8 months. The new time estimate places the project conclusion in mid to late April which is well within that time frame.