Project Plan

For agentTool III (Static)

Version 1.0

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

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1. Task Breakdown

1.1 Inception Phase

The inception phase of the project will be focused on project requirements. A vision document will be prepared detailing the project overview and the critical project requirements. A project plan describing the work to be accomplished in each phase of the project will also be prepared. The project plan will include an estimate of the workload of the project and will establish a schedule for completion of all project activities. A software quality assurance plan will describe the required documentation, standards and conventions that will be used to ensure product quality.

A simple prototype will be built during this phase just so as to establish the project feasibility. It will give an idea about the look and feel of the final product.

The approval of the required documentation and the first prototype by the supervisory committee after the first presentation will mark the conclusion of the inception phase.

1.2 Elaboration Phase

Architecture design will be the focus of this phase. The complete architectural design will be documented using appropriate UML diagrams. Revisions will be made to the initial vision document and the project plan based on feedback from committee members. At least one component of the project will be formally specified using formal specification methodologies. A test plan will describe the way in which testing will be carried out and how defects will be tracked and reported. The technical inspectors will perform architecture review and provide feedback. Finally the first prototype will be refined to demonstrate more product features / functionality.

The approval of the required documentation and the second prototype by the supervisory committee after the second presentation will mark the conclusion of the elaboration phase.

1.3 Production Phase

Project implementation and testing will be the focus of the production phase. A low level component design will be developed here. The work in this phase will primarily consist of code development, code documentation and unit testing.
1.3.1 Code development and testing

All project components will be developed and integrated. Unit testing and integration testing will be performed. All test results will be evaluated and documented. Traceability will be established with the requirements as present in the vision document.

1.3.2 Documentation

All code will be thoroughly documented. Javadocs will be generated to document package structure with information about various classes, methods and attributes. A test report outlining the conduction and results of the tests will be prepared. A user manual will be prepared which describes the installation and use of the software.

The approval of the required documentation and the final project implementation by the supervisory committee after the third presentation will mark the conclusion of the production phase.
2. Cost Estimate

2.1 COCOMO

Project effort and time will be estimated using the COCOMO estimation model by Barry Boehm. The agent tool (static) will be a tool with average complexity. Hence it will be classified as an “organic” project according to the COCOMO model. The COCOMO model provides the following equations for the organic category.

\[
\text{Effort} = 3.2 \times \text{EAF (Size)}^{1.05}
\]

\[
\text{Time (in months)} = 2.5(\text{Effort})^{0.38}
\]

Size and EAF values are estimated to calculate effort. The Size is measured in KLOC. The EAF value stands for effort adjustment factor and is the product of 15 adjustment factors. Each adjustment factor is classified as very low, low, normal, high, or very high. The value of each adjustment factor lies within a range and the classification will determine where on the range the value falls. The table below lists all the adjustment factors and their ranges.

<table>
<thead>
<tr>
<th>ID</th>
<th>Effort Adjustment Factor</th>
<th>Value Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>RELY</td>
<td>Required reliability</td>
<td>0.75 - 1.40</td>
</tr>
<tr>
<td>DATA</td>
<td>Database size</td>
<td>0.94 – 1.16</td>
</tr>
<tr>
<td>CMPLX</td>
<td>Product complexity</td>
<td>0.70 – 1.65</td>
</tr>
<tr>
<td>TIME</td>
<td>Execution time constraint</td>
<td>1.00 – 1.66</td>
</tr>
<tr>
<td>STOR</td>
<td>Main storage constraint</td>
<td>1.00 – 1.56</td>
</tr>
<tr>
<td>VIRT</td>
<td>Virtual machine volatility</td>
<td>0.87 – 1.30</td>
</tr>
<tr>
<td>TURN</td>
<td>Computer turnaround time</td>
<td>0.87 – 1.15</td>
</tr>
<tr>
<td>ACAP</td>
<td>Analyst capability</td>
<td>1.46 – 0.71</td>
</tr>
<tr>
<td>AEXP</td>
<td>Applications experience</td>
<td>1.29 – 0.82</td>
</tr>
<tr>
<td>PCAP</td>
<td>Programmer capability</td>
<td>1.42 – 0.70</td>
</tr>
<tr>
<td>VEXP</td>
<td>Virtual machine experience</td>
<td>1.21 – 0.90</td>
</tr>
<tr>
<td>LEXP</td>
<td>Language experience</td>
<td>1.14 – 0.95</td>
</tr>
<tr>
<td>MODP</td>
<td>Use of modern practices</td>
<td>1.24 – 0.82</td>
</tr>
<tr>
<td>TOOL</td>
<td>Use of software tools</td>
<td>1.24 – 0.83</td>
</tr>
<tr>
<td>SCED</td>
<td>Required development schedule</td>
<td>1.23 – 1.10</td>
</tr>
</tbody>
</table>
Values for the adjustment factors for Agent Tool (Static)
- RELY a low of 0.9
- DATA a low of 0.94
- CMPLX an average 1.2
- TIME as low of 1.1
- STOR a low of 1
- VIRT 0.95
- TURN 0.9
- ACAP 0.8
- AEXP 1
- PCAP 1.2
- VEXP 1.1
- LEXP 1
- MODP 0.9
- TOOL 0.9
- SCED 1.15

Hence the EAF value is: 0.94

Size Estimation: The previous agentTool has a hand-generated codebase of 3KLOC. Since the new tool has additional functionality for modeling capabilities, I estimate the tool size to be around 3.5KLOC

Hence, the effort calculates to:

\[ \text{Effort} = 3.2 \times 0.94 \times 3.5^{1.05} = 11.2 \text{ staff months} \]

Now time can be calculated as

\[ \text{Time} = 2.5 \times 11.2^{0.38} = 6.2 \text{ months} \]

The 11.2 staff months of project time is more than that allotted for an MSE Project. This value is higher than expected since the COCOMO model is designed for team projects and not individual projects. As the communication channels for building an independent tool with just one main developer and only some common work between two people are considerably smaller, I believe that an estimate of 7-8 staff months should be realistic.

The time estimate is not applicable in our case since the model considers a team of developers working on the project. This project will be the responsibility of 1 primary developer with only some common work between two people in the initial phase.
3. **Architecture Elaboration Plan**  
The following tasks will be completed in the elaboration phase and before the second presentation.

**3.1 Revision of Vision Document**  
The Vision Document will be revised to provide a complete representation of all requirements. These requirements will be ranked according to importance. The document revisions will be based on feedback from the committee members after the first presentation. The revised document will be approved by the major professor.

**3.2 Revision of Project Plan**  
Revisions will be made to the project plan to update any schedule changes for the project. These revisions will be based on feedback from the committee members after the first presentation. The updated cost and effort estimate will be approved by the major professor.

**3.3 Architecture Design**  
Complete project design will be documented with the help of UML diagrams. Each component in the architecture will be documented at the interface level. The underlying data model will be refined, updated and documented. Class diagrams, sequence diagrams and state chart diagrams will be used as needed.

**3.4 Development of Prototype**  
The second prototype should be able to demonstrate more functionality and product features. Critical requirements as identified in the vision document will be demonstrated.

**3.5 Test Plan**  
A plan will be developed for the project to address the required tests to show that the product satisfies the requirements as mentioned in the vision document. The plan will include evaluation criteria for all critical use cases and a set of test data deemed adequate for acceptance testing.

**3.6 Formal Technical Inspections**  
The architecture design will be inspected by Binti Sepaha and Dominic Gelas, two other MSE students who have agreed to participate in the inspection. A formal checklist to be used by the inspectors will be prepared by the student.
3.7 Formal Requirements Specification

At least one component of the design will be formally specified using methodologies like OCL and USE. As of now it is proposed that a part of the object model will be formalized.