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**Process/Task Estimation Technique**

The tasks required for this project can be broken down into the three main categories of planning, design, and production.

**Planning**Planning includes all documentation tasks including estimations, a breakdown and analysis of the problem, methods of communication, and requirement gathering.

* **Estimations**:  
  The time involved in producing the estimations includes each member gathering information on their past projects to produce a value for the number of lines they code over time working on a project (hours in this case), and assessing the difficulty each member has with different types of functions based on their assigned sections of the project. This process is expected to take roughly 40 minutes per member, along with an assembly of the information at 20 minutes for one member, totaling **3 hours**.
* **Analysis:**To analyze and breakdown the problem, the requirements must be evaluated. To make a list of requirements from specifications given is expected to take roughly 30 minutes as a group to ensure nothing is missed. This is to be followed by time spent gathering further clarification on requirements as issues arise, taking about an hour, totaling **3 hours**.
* **Methods of Communication:**Settling the manner of communication to be used with members of the group is estimated to be 20 minutes as a group, as well as an additional 20 for the leader to establish methods with the project managers. Accounting for six meetings to work out assignments, questions, and coordination at 1 hour long with all members in attendance, communication time totals **25 hours and 40 minutes.**
* **Tool Familiarization**:  
  Time for each member to become accustomed to and familiar with the various tools and software necessary to communicate and collaborate must also be accounted for. With four programs new to a majority of the members, an allotment of 20 minutes per program is given. This makes for 1 hour and 20 minutes per person, at **5 hours** total.
* **Documentation:**The bulk of the time consumed in planning will be the documentation and artifact generation for all the estimates and plans. For the various amounts of information to be discussed in each artifact, and the time to sort and present the information necessary, there is an estimate of 4 hours per major section. This results in an estimation of 6 hours per member, totaling **24 hours**.

**60 hours and 40 minutes**

**Design**The design phase of the project consists of the tasks of developing algorithms from the requirements and preparing test cases for the algorithms.

* **Communication:**  
  The bulk of the communication is centered around gathering the requirements properly to make sure the project is done correctly and solves the correct problem. This is estimated to take 4 half hour meetings to update assignments and track proper progress, three regular 1 hour meetings for questions and task clarification, four 3-hour meetings to review document drafts, and one 6-hour meeting to review and assembly of final document, totaling **88 hours**.
* **Requirements Gathering:**  
  Before the algorithms can be developed the requirements must be gathered, and analyzed. This includes decomposing the functionality into a list of requirements, seeking clarification on any assumptions that would have to be made, and reporting a definitive list encompassing the complete list of requirements. The decomposition consists of identifying use cases and creating corresponding diagrams, summaries, and the resulting documentation. This is estimated to take approximately 5 hours per each of the six use cases identified. In addition to this, there expected to be 4 hours for the summary, as well as an additional 1 hour per person to ensure cohesion among all requirements documents, for a total of **38 hours**
* **Models:**This task involves creating and documenting the data, functional, and behavioral models. Modeling is estimated to take 4 hours per model per person, with an additional 3 hours per person for document drafting, and 1 hour per person for revisions. With 3 model sections, this totals **64 hours**.
* **Test Strategy:**This section contains the pre-planning for the test case preparation. It contains the planning for what the test cases will be designed to test for, as well as how the application is expected to respond to the given tests. This is estimated to take roughly 1 hour per use case, for a total **of 6 hours.**
* **Algorithms:**  
  Time consideration for the algorithm stage begins with deciding how to handle, store, and format the data. This decision as a group should take about 1 hour. Based on the initial presentation of functionality and their complexities, assuming the final list is double, the algorithm design should take an estimated 3 hours per use case, for 18 hours. A second check on the correctness of the algorithms, along with ensuring cohesion between them should take roughly 5 hours, totaling **24 hours**.
* **Test case preparation**:  
  The design of test cases for the algorithms should take 3 hours as a group, with a second check for missing test case possibilities taking about 1 hour and 30 minutes, totaling **18 hours**.

**238 Hours**

**Execution**The final phase is the actual coding, running the test cases, and debugging the program.

* **Communication:**Communication for this part of the project is expected to be four 30 minute meetings, four 1 hour meetings, two 3 hour meetings for finalizing documents, and one 5-hour meeting for final program changes, totaling **62 hours.**
* **Coding**:  
  The conversion of algorithm into code is at estimated to be a little under half the time to develop the algorithms per person, for a total of **20 hours**.
* **Testing**:  
  Allowing time for set up and takedown, the time for running test cases is estimated to take about 4 hours per person, for a total of **16 hours**.
* **Debugging**:  
  Time allotment for debugging and addressing possible oversights based on time spent ensuring correctness of algorithms is **10 hours**.
* **Documentation**:  
  The documentation for the final pieces of design is given an allotment of two times the algorithm development time, plus an additional 40 hours for any additional documentation. This is to allow for proper recording and necessary explanations and diagrams pertaining to each algorithm, resulting in an estimate of **76 hours**.

**184 Hours**

**2.3.6 Process/Task Estimate**

The task estimate for the project based on the times to complete the tasks included in the planning, design, and execution is **398 hours and 40 minutes**.

After accounting for the planning phase taking an actual 116 hours, the task estimate for the project going into the second phase is **538 hours.**