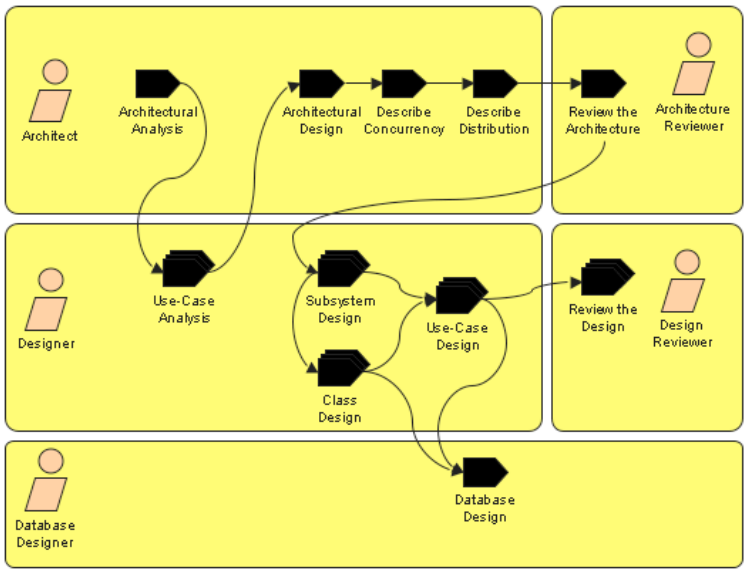
Homework Assignment #4
Software Engineering 520/620
Assigned: December 1, 2003
Due: December 18, 2003

1. Rational Unified Process: For each of the phases in the diagram below, discuss which UML diagrams are used and why.



2. Inspections, walkthroughs and code reading are forms of reviews.
    a. Distinguish among these three techniques in terms of focus, number and type of persons involved, formality, and any other characteristic you feel is pertinent.
    b. What are the primary advantages and disadvantages of reviews?
    c. What are the two most important features of an effective inspection? Why?
    d. Describe the form of review used in the Cleanroom process and contrast with Fagan inspections.

3. Define or describe and discuss:
    a. Symbolic model checking vs automata theoretic model checking
    b. Finite-State Verification vs. mathematical reasoning
    c. Conservative models

4. Testing
    a. Discuss the difference between “white-box” and “black-box” testing
    b. Describe typical approaches to determining test data using “black-box” analysis
    c. For the coverage metrics:
        1. distinguish “all-paths” and “all-branches”
        2. distinguish “all-uses” and “all-du-paths”
    d. Describe mutation analysis

5. **[621 only]** Consider the following code fragment for a GCD algorithm:

```
int F (int a, int b)
{
  int g = a, m = b;
  if (a < b) {g = b; m = a;}
  while (m)
  {
    int s = g;
    g = m;
    m = s % m;
  }
  return
g;
}
```

a. Draw a control flow graph for this code fragment
b. Suppose the "if statement" in the box were deleted. Would the fragment compute the same result? Use symbolic execution to support your answer.
c. Define "live variables" as used in data flow analysis.
    1. Is "live variable" analysis a forward or reverse flow problem?
    2. When would you use "all paths "and when would you use "any paths" in "live variable" analysis?
    3. Define IN & OUT functions and the GEN & KILL sets for "live variable" analysis