

CptS 322 Software Engineering Principles I

Spring 2021

Homework 2

(Due February 24th, 2021 on [Blackboard](#))

1. (10 points) For each of the following software projects, what you think would be the best process model for managing the development process? Justify your answer for each project as well.

- a) A system to control anti-lock braking in a car
- b) A virtual reality system to support software maintenance
- c) A university accounting system that replaces an existing system
- d) An interactive travel planning system that helps users plan journeys with the lowest environmental impact.

Answer:

a) An anti-lock braking system is a safety-critical system and therefore would require a lot of initial analysis before implementation. This would require a plan-driven approach with the requirements carefully analyzed. For these reasons, the waterfall model is the most appropriate process model to use.

b) A virtual reality system would require a more incremental process. Since the exact needs of the virtual reality system won't be determined until it is used and tested, the user interface of a VR system is more prevalent, and bugs can be found at any time, the best process model would be agile.

c) Waterfall has formal structure to help manage the process, however the drawback is that it can be difficult to accommodate changes after starting. The waterfall model makes it easier to handle large requirements, design, and implementation requirements by having a series of steps to go through.

d) This would be a system with a complex user interface, but which must be stable and reliable. An incremental development approach is the most appropriate as the system requirements will change as real user experience with the system is gained.

2. (10 points) Provide three examples of software projects that would be amenable to the waterfall model. Be specific.

Answer:

1. NASA flight controls for spaceships would be amenable to waterfall as it is high risk and going through the full process would be very helpful.

2. A calculator that reduces matrices would be simple enough that there are such few features required, waterfall would be the fastest.

3. A blog would be simple enough and have such few changing requirements that waterfall would be an ideal method.

3. (10 points) Provide three examples of software projects that would be amenable to the prototyping model. Be specific.

Answer:

1. Data organization for historical weather statistics where the prototype can show if a proposed data structure works with the program implemented.
2. A programming assignment where many iterations and test cases must be implemented.
3. A program that produces some kind of graphics as you would be able to quickly see if the program outputs graphics or not.

4. (10 points) Spiral model and incremental model are two software process models. Explain how these two models are different and related.

Answer:

The spiral model is a combination of the incremental and waterfall models. Software being developed with the spiral model goes through multiple cycles of waterfall and like the incremental process, uses information from the previous cycles to improve the next one. Neither the waterfall nor incremental process have a predefined deadline since it is difficult to determine when to stop iterating or cycling before it is reached. Additionally, the incremental model is more linear than the spiral model.