



## Lesson Plan

**Course Title: Computer Programming**

**Session Title: Software Life Cycle**

**Lesson Duration:**

2 hours

**Performance Objective:**

Upon completion of this assignment, the student will understand the software life cycle and its importance to a programming project.

**Specific Objectives:**

- Students will identify 3 models of software life cycles.
- Students will differentiate between different types of software life cycles.
- Students will list the 5 stages of the Waterfall model.

### Preparation

**TEKS Correlations: 130.276.Computer Programming**

- **(5B) Identify software development processes and issues;**
- **(5C) Explain the software system life cycle approach.**

**Instructor/Trainer**

**References:**

- Content-developer knowledge
- "Big Java" by Cay Horstmann
- "Barron's AP Computer Science Study Guide" by Roselyn Teukolsky

**Instructional Aids:**

- Instructional Presentation
- Activity – Group Discussion about a sample project
- Activity Solution with suggested answers
- Quiz
- Quiz Solution

**Materials Needed:**

Each student will need a copy of Activity Handout.

**Equipment Needed:**

No special equipment needed.

**Introduction**

<b>MI</b>	<b>Introduction (LSI Quadrant I):</b>
	Talk to the students about the process of a programming project that you would do in class. Emphasize the concepts that you (the teacher) are the customer; you have specific requirements and a deadline for the project. The student is the programmer; the programmer must understand the requirements and the deadline before beginning the project.

**Outline**

<b>MI</b>	<b>Outline (LSI Quadrant II):</b>	<b>Instructor Notes:</b>
  	<ul style="list-style-type: none"> <li>• Present the Presentation while students take notes. Slides are discussed below:             <ol style="list-style-type: none"> <li>1. The software life cycle is a concept that you can talk about without special equipment. This concept should be introduced early and referred to frequently as you progress through the class.</li> <li>2. Discuss why a defined process is necessary for programmers – especially programmers working for real clients in the business world.</li> <li>3. Industry standards define phases and sequences so that all managers/programmers/customers can understand the entire process.</li> <li>4. Several approaches have been developed over the years, but the 3 most common are Waterfall, Spiral , and Extreme Programming models.</li> <li>5. The Waterfall Model will be discussed on the next 6 slides. As you present this slide, briefly name the stages and allow the students to input what they think might happen at each level.</li> <li>6. Waterfall Stage 1 – Analysis -- The stage where the managers and customers come together to discuss the requirements and inputs and outputs. They begin with a written description of the project.</li> <li>7. Waterfall Stage 2 – Design – The stage where the managers and programmers decide the actual programs needed. They determine how the programs will</li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>• Allow open discussion regarding the software life cycle stages</li> </ul>

	<p>work together, how data will be shared, and implement an initial timeline.</p> <p>8. Waterfall Stage 3 – Implementation –This is the biggest phase of all for programmers. This is where the coding happens.</p> <p>9. Waterfall Stage 4 – Testing – The programs must be tested and retested for accuracy and reliability. Try to include all cases of inputs and outputs.</p> <p>10. Waterfall Stage 5 – Deployment – The programming applications are introduced to the customer and users. Also, the users must be trained on how to use the software. Maintenance will continue at this stage.</p> <p>11. The Spiral Model is introduced. Discuss the similarities and differences between the spiral model and the water fall model.</p> <p>12. The Spiral Model approach uses repeated steps to ensure a quality product. The project is broken into smaller parts and tested throughout the development.</p> <p>13. Extreme Programming approach is introduced on Slide 13. Once again, find similarities and differences between the 3 approaches. Extreme Programming incorporates the idea that customers should be part of the team during the entire development timeline.</p>	
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**Application**

<b>MI</b>	<b>Independent Practice (LSI Quadrant III):</b>
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	Students will complete the group activity to understand the different life cycle processes. Encourage the groups to present their ideas.
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**Summary**

<b>MI</b>	<b>Review (LSI Quadrants I and IV):</b>
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	<ul style="list-style-type: none"> <li>Allow the groups to present their ideas. You will have open discussion and sharing.</li> </ul>
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**Evaluation**

<b>MI</b>	<b>Informal Assessment (LSI Quadrant III):</b>
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	<ul style="list-style-type: none"> <li>Observe the students' discussion.</li> </ul>
<b>MI</b>	<b>Formal Assessment (LSI Quadrant III, IV):</b>
	<ul style="list-style-type: none"> <li>Quiz</li> </ul>
<b>Extension</b>	
<b>MI</b>	<b>Extension/Enrichment (LSI Quadrant IV):</b>
	<ul style="list-style-type: none"> <li>Encourage the students to come up with their own projects that would be helpful in their lives. You can also talk about mobile phone applications.</li> </ul>

Icon	MI	Teaching Strategies	Personal Development Strategies
	<b>Verbal/ Linguistic</b>	Lecture, discussion, journal writing, cooperative learning, word origins	Reading, highlighting, outlining, teaching others, reciting information
	<b>Logical/ Mathematical</b>	Problem solving, number games, critical thinking, classifying and organizing, Socratic questioning	Organizing material logically, explaining things sequentially, finding patterns, developing systems, outlining, charting, graphing, analyzing information
	<b>Visual/Spatial</b>	Mind-mapping, reflective time, graphic organizers, color-coding systems, drawings, designs, video, DVD, charts, maps	Developing graphic organizers, mind-mapping, charting, graphing, organizing with color, mental imagery (drawing in the mind's eye)
	<b>Musical/ Rhythmic</b>	Use music, compose songs or raps, use musical language or metaphors	Creating rhythms out of words, creating rhythms with instruments, playing an instrument, putting words to existing songs
	<b>Bodily/ Kinesthetic</b>	Use manipulatives, hand signals, pantomime, real life situations, puzzles and board games, activities, role-playing, action problems	Moving while learning, pacing while reciting, acting out scripts of material, designing games, moving fingers under words while reading
	<b>Intrapersonal</b>	Reflective teaching, interviews, reflective listening, KWL charts	Reflecting on personal meaning of information, studying in quiet settings, imagining experiments, visualizing information, journaling
	<b>Interpersonal</b>	Cooperative learning, role-playing, group brainstorming, cross-cultural interactions	Studying in a group, discussing information, using flash cards with other, teaching others
	<b>Naturalist</b>	Natural objects as manipulatives and as background for learning	Connecting with nature, forming study groups with like-minded people
	<b>Existentialist</b>	Socratic questions, real life situations, global problems/questions	Considering personal relationship to larger context

Name(s): \_\_\_\_\_

Date: \_\_\_\_\_

## SOFTWARE LIFE CYCLE ACTIVITY

Discuss the following scenarios and answer the questions:

- I. Joe's Electronics Company needs a new program to better manage their inventory. They need a report each day that shows what products were sold during the day and the quantity available at that time. Using the Waterfall model, show how the project should be developed.

Analysis	
Design	
Implementation	
Testing	
Deployment	

- II. After reviewing your Waterfall Model, the customer decides that they need some changes. How would these changes fit into the Spiral Model?

III. Using **www.extremeprogramming.org**, answer the following questions about this project:

a. \_\_\_\_\_

Describe "honest plans" regarding this project: \_\_\_\_\_

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b. \_\_\_\_\_

How does "iterative planning" relate to this project? \_\_\_\_\_

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c. \_\_\_\_\_

Why is "team empowerment" important in this project? \_\_\_\_\_

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Name(s): \_\_\_\_\_

Date: \_\_\_\_\_

## SOFTWARE LIFE CYCLE ACTIVITY KEY

Discuss the following scenarios and answer the questions:

IV. Joe's Electronics Company needs a new program to better manage their inventory. They need a report each day that shows what products were sold during the day and the quantity available at that time. Using the Waterfall model, show how the project should be developed.

Answers may vary

Analysis	<p>end result – accurate report to show ending inventory and sales</p> <p>inputs – beginning inventory, daily sales</p> <p>The report should identify the beginning quantity of each item along with the individual sales transactions. Each line should reflect the current quantity on hand at the time of the report.</p>
Design	<p>One program needed to print the desired report.</p> <p>Program should be implemented in one week.</p>
Implementation	<p>Coding by the programmers.</p>
Testing	<p>Intensive testing and troubleshooting.</p> <p>Test the following:</p> <ul style="list-style-type: none"> <li>■ quantity on hand is accurately represented</li> <li>■ what if sales exceeds quantity on hand?</li> <li>■ what if new items are introduced?</li> <li>■ try to think of all possibilities</li> </ul>
Deployment	<p>Present the program to the customer</p>

	<p>Train the customer</p> <p>Make last-minute changes as required</p>
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- V. After reviewing your Waterfall Model, the customer decides that they need some changes. How would these changes fit into the Spiral Model?

The customer decides that the program needs to also reflect when inventory is purchased from the manufacturer. Therefore, the changes to the report must be implemented.

The customer questions the accuracy of the report. Further testing must be completed.

VI. Using **www.extremeprogramming.org**, answer the following questions about this project:

a. \_\_\_\_\_ D  
Describe "honest plans" regarding this project: \_\_\_\_\_

<http://www.agile-process.org/honest.html>

Truthfully, a week was probably not long enough. If a change needs to be made in the plan, then the project should be refined. Make sure that the customer is involved with creating the timeline.

b. \_\_\_\_\_ H  
How does "iterative planning" relate to this project? \_\_\_\_\_

<http://www.agile-process.org/iterative.html> \_\_\_\_\_

Rather than the customer laying out all the needs/desires at the beginning, the programmer can complete the project incrementally. The programmer would complete pieces of the report with the customer and refine each piece before the entire project is completed. The customer would be in on the day-to-day refinement of the project.

c. \_\_\_\_\_ W  
Why is "team empowerment" important in this project? \_\_\_\_\_

<http://www.agile-process.org/team.html>

Team empowerment means that everyone is responsible, not just the manager. The customer is equally responsible.



Name(s): \_\_\_\_\_

Date: \_\_\_\_\_

## SOFTWARE LIFE CYCLE QUIZ

### Waterfall Model

- a. Analysis      b. Design      c. Implementation      d. Testing      e.

### Deployment

Match the term to the Waterfall stage:

- |       |     |                                    |
|-------|-----|------------------------------------|
| _____ | 1.  | decide what programs are needed    |
| _____ | 2.  | verify the results of each program |
| _____ | 3.  | user training                      |
| _____ | 4.  | determine inputs                   |
| _____ | 5.  | written description of the project |
| _____ | 6.  | maintenance                        |
| _____ | 7.  | the coding phase                   |
| _____ | 8.  | determine program relationships    |
| _____ | 9.  | test all input cases               |
| _____ | 10. | decide the end result              |
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### Multiple Choice

- |       |    |  |
|-------|----|--|
| _____ | 1. | Who originally proposed the Spiral Model?<br>a. Department of Defense<br>b. Barry Boehm<br>c. <a href="http://www.extremeprogramming.org">www.extremeprogramming.org</a><br>d. no one knows for sure |
| _____ | 2. | Which model(s) consist(s) of 5 distinct phases which must only go from beginning to end?<br>a. Waterfall Model<br>b. Spiral Model<br>c. Extreme Programming Model<br>d. all the above                |

- \_\_\_\_\_ 3. Which model ensures that customers are an integral part of the team?
- a. Waterfall Model
  - b. Spiral Model
  - c. Extreme Programming Model
  - d. all the above
- \_\_\_\_\_ improved? 4. Which model allows for the project to be constantly refined and improved?
- a. Waterfall Model
  - b. Spiral Model
  - c. Extreme Programming Model
  - d. all the above
- \_\_\_\_\_ 5. Which model uses the heartbeat as the center of the project?
- a. Waterfall Model
  - b. Spiral Model
  - c. Extreme Programming Model
  - d. all the above
- \_\_\_\_\_ 6. When was Extreme Programming introduced?
- a. 1970s
  - b. 1988
  - c. 1996
  - d. 2010
- \_\_\_\_\_ 7. What is the emphasis of Extreme Programming?
- a. Smaller budget
  - b. Amazing coding
  - c. Strict deadline
  - d. Customer Satisfaction
- \_\_\_\_\_ 8. What is the starting point for Extreme Programming?
- a. Unfinished Features
  - b. Team Empowerment
  - c. Working Software
  - d. Daily Communication

- \_\_\_\_\_ 9. How are prototypes used in the Spiral Model?
- a. to remove the formal structure of the process
  - b. to maintain the integrity of the deadline
  - c. to ensure that feedback is productive
  - d. to break up the project into smaller pieces
- \_\_\_\_\_ 10. Why is a software life cycle important?
- a. to ensure a quality product
  - b. to speed up the time required to complete the project
  - c. to keep the programming efficient
  - d. all the above



Name(s): \_\_\_\_\_

Date: \_\_\_\_\_

## SOFTWARE LIFE CYCLE QUIZ

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### Waterfall Model

- b. Analysis      b. Design      c. Implementation      d. Testing      e.  
Deployment

### Match the term to the Waterfall stage:

- B**      1.      decide what programs are needed  
**D**      \_      2.      verify the results of each program  
**E**           3.      user training  
**A**           4.      determine inputs  
**A**           5.      written description of the project  
**E**           6.      maintenance  
**C**           7.      the coding phase  
**B**           8.      determine program relationships  
**D**           9.      test all input cases  
**A**           10.      decide the end result
- 

### Multiple Choice

- B**      1.      Who originally proposed the Spiral Model?  
         a. Department of Defense  
         b. Barry Boehm  
         c. [www.extremeprogramming.org](http://www.extremeprogramming.org)  
         d. no one knows for sure
- A**      2.      Which model(s) consist(s) of 5 distinct phases which must only go  
         from beginning to end?  
         a. Waterfall Model  
         b. Spiral Model  
         c. Extreme Programming Model  
         d. all the above
- C**      \_      3.      Which model ensures that customers are an integral part of the  
         team?  
         a. Waterfall Model  
         b. Spiral Model  
         c. Extreme Programming Model  
         d. all the above

- B** improved? 4. Which model allows for the project to be constantly refined and improved?
- a. Waterfall Model
  - b. Spiral Model
  - c. Extreme Programming Model
  - d. all the above
- C** 5. Which model uses the heartbeat as the center of the project?
- a. Waterfall Model
  - b. Spiral Model
  - c. Extreme Programming Model
  - d. all the above
- C** \_ 6. When was Extreme Programming introduced?
- a. 1970s
  - b. 1988
  - c. 1996
  - d. 2010
- D** \_ 7. What is the emphasis of Extreme Programming?
- a. Smaller budget
  - b. Amazing coding
  - c. Strict deadline
  - d. Customer Satisfaction
- A** 8. What is the starting point for Extreme Programming?
- a. Unfinished Features
  - b. Team Empowerment
  - c. Working Software
  - d. Daily Communication
- D** \_ 9. How are prototypes used in the Spiral Model?
- a. to remove the formal structure of the process
  - b. to maintain the integrity of the deadline
  - c. to ensure that feedback is productive
  - d. to break up the project into smaller pieces
- A** 10. Why is a software life cycle important?
- a. to ensure a quality product
  - b. to speed up the time required to complete the project
  - c. to improve the programming efficiency
  - d. all the above