جامعة المستقبل
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كلية العلوم
قسم الانظمة الطبية الذكية

المحاضرة التاسعة

Software engineering

المادة : Software engineering
المرحلة : الثالثة
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D- Incremental model :

A method of software development where the product is designed, implemented and tested incrementally until the product is finished. It involves both ***development*** and ***maintenance***. The product is defined as finished when it satisfies all of its requirements. **This model combines the elements of the waterfall and evolutionary model** (which are then applied in an **iterative manner**).

Incremental model lifecycle:

- The product is decomposed into a number of components, each of which is designed and built separately. Each component is delivered to the client when it is complete.

- The incremental model can applies the ***waterfall model*** incrementally as illustrated in Figure 9.1.

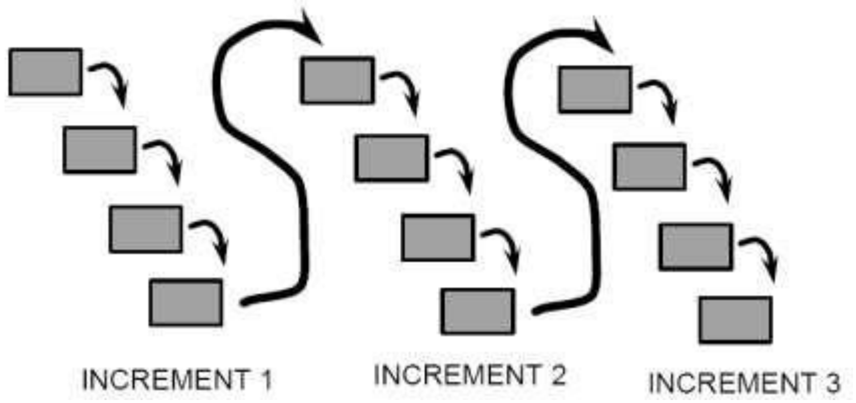

Figure 9.1: Each increment is a mini-waterfall.

- **Multiple development cycles take place here,** making the life cycle a "multi-waterfall" cycle. **Cycles** are divided up into smaller, more easily managed modules.

- **Each module passes through the requirements**, design, implementation and testing phases. A working version of software is produced during the first module, so you have working software early on during the software life cycle.

- **Each subsequent release of the module adds function to the previous release.** The process continues till the complete system is achieved (see Figure 9.2).

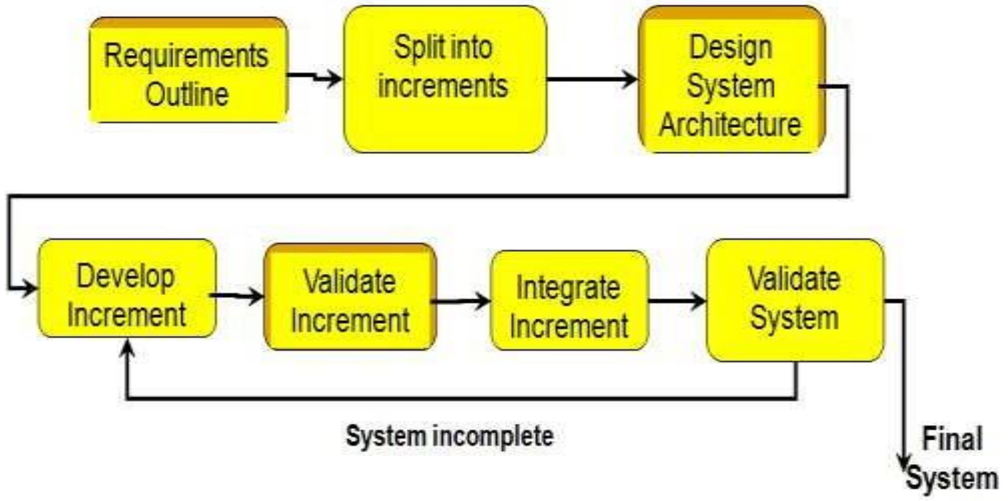

Figure 9.2: The incremental model life-cycle

Features of Incremental Model

1- Prioritizes the services to be provided by the system.
2- Maps these requirements to ***Increment*** based on priority.
3- Freezes requirement for the current *Increment.*
  - Requirements for the later increments can evolve concurrently.
4- Each ***Increment*** release is a working system:
  - Allows user to experiment.
  - Can be put into service right away.

Advantages of Incremental Model:

1. Initial product delivery is faster with Lower cost.
2. Core product is developed first (i.e. main functionality is added in the first increment).
3. Regression testing should be conducted after each iteration. During this testing, faulty elements of the software can be quickly identified because few changes are made within any single iteration.
4. It is generally easier to test and debug than other methods of software development because relatively smaller changes are made during each iteration.
5. With each release a new feature is added to the product.
6. Customer can respond to feature and review the product.
7. Risk of changing requirement is reduced.
8. Work load is less.

Disadvantages of Incremental Model:

1. Requires good analysis.
2. Resulting cost may exceed the cost of the organization.
3. Each phase of an iteration is rigid and do not overlap each other.
4. As additional functionality is added to the product, problems may arise related to system architecture which were not evident in earlier prototypes.
5. Hard to map requirement into small increments (< 20,000 lines of code).
6. Hard to define the basic services that are shared by all subsequent increments.

When to use the Incremental model:

1- This model can be used when the requirements of the complete system are clearly defined and understood.
2- Major requirements must be defined; however, some details can evolve with time.
3- There is a need to get a product to the market early.
4- A new technology is being used.
5- Resources with needed skill set are not available.
6- There are some high risk features and goals.