EXPERIMENT NO: 01

Aim: Apply suitable software development model for the given scenario.

Theory:

- **Software Development Process:**

  A software development process is the process of dividing software development work into distinct phases to improve design, product management, and project management. It is also known as a software development life cycle. Most modern development processes can be vaguely described as agile. Other methodologies include waterfall, prototyping, iterative and incremental development, spiral development and rapid application development.

- **Types of Development Models:**
  1. Waterfall Model.
  2. Incremental Model.
  3. RAD Model.
  4. Prototyping.
  5. Spiral Model.

- **Waterfall Model**:

  1. The Waterfall Model is earliest SDLC approach.
  2. It is also known as Classic Life Cycle Model.
  3. In this Model, each phase must be completed before the next phase can begin.

  - Features:
    1. It is good to use when technology is well understood.
    2. The project is short and cost is low.
    3. Risk is zero or simple and easy.

  1. Advantages:
     1. It is simple and easy.
     2. Easy to manage.

3. It is good for low budget small project.

2. Disadvantages:
    1. It is not good for complex and object-oriented programming.
    2. It is a poor model for long and ongoing project.

3. Diagram:

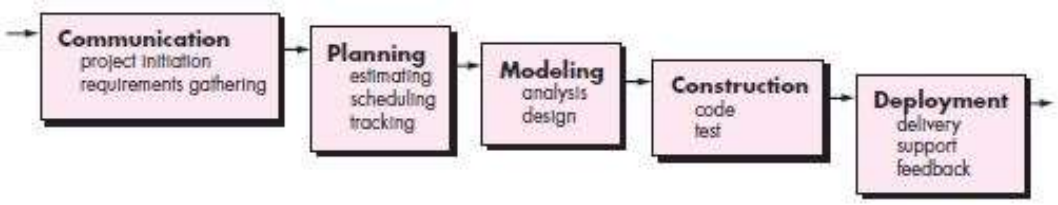

Fig.1.1 Waterfall Model

- **Incremental Model:**

    Incremental model is a process of Software Development where requirements are broken down into multiple modules of Software Development Cycle. Increment means to add something. Incremental development is done in steps or in increments from communication, planning, modeling, construtions and deployment. Each iterations passes through all 5 phases . And each subsequent release of the system adds function to the previous relese until all designed fuctionality has been implemeted.

4. Features :
    1. Incremental is the combination of Linear and Prototype.
    2. Incremental Delivery.
    3. Priority to user's highly recommended requirements.
    4. Involvement of Users.
    5. Lower risk.
    6. Highest Priority System means in each increment they can easily find errors.
    7. At small requirements we can start our model.
    8. After every cycle the product is given to the customer.

5. Advantages:
    1. Work with small size team.

2. Initial product delivery is faster.
3. Customer response or feedback is considered.
4. It is easier to test and Debug during a smaller iteration.
5. The model is more flexible.
6. Easier to manage risk.

6. Disadvantages:
   1. Actual cost will be more than Estimated cost.
   2. Needs good planning and design.

7. Diagram:

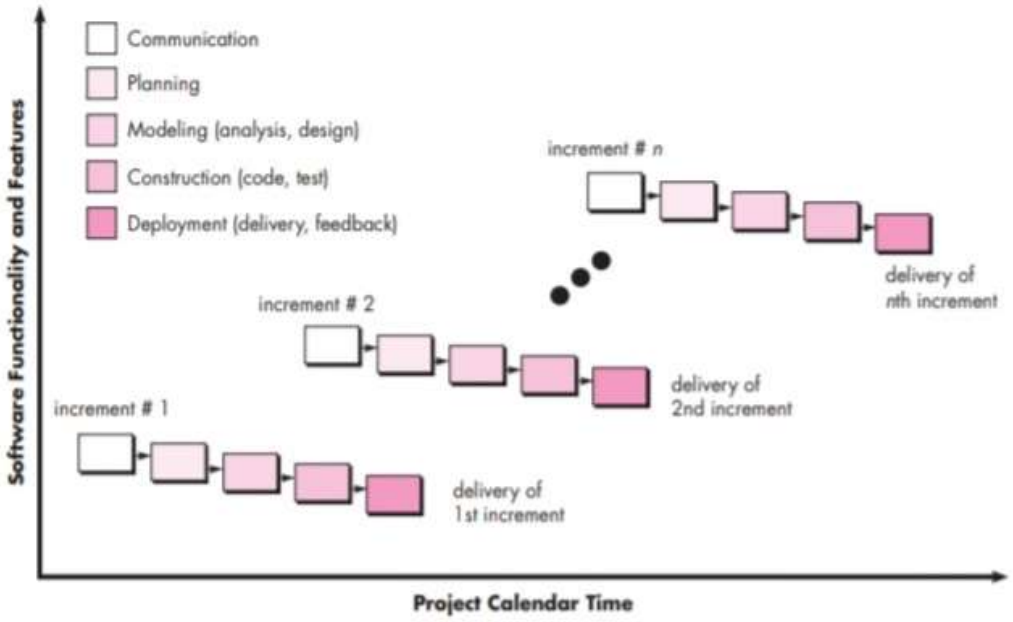

Fig.1.2 Incremental Model.

- **RAD Model:**

RAD or Rapid Application Development process is an adoption of the waterfall model; it targets at developing software in a short span of time. RAD follow the iterative.

- SDLC RAD model has following phases
  1. Business Modelling.
  2. Data Modelling.
  3. Process Modelling.
  4. Application Generation.
  5. Testing and Turnover.

It focuses on input-output source and destination of the information. It emphasizes on delivering projects in small pieces; the larger projects are divided into a series of smaller projects. The main features of RAD model are that it focuses on the reuse of templates, tools, processes, and code.

8. Different phases of RAD model include:

- Business Modelling:

  On basis of the flow of information and distribution between various business channels, the product is designed.

- Data Modelling:

  The information collected from business modelling is refined into a set of data objects that are significant for the business.

- Process Modelling

  The data object that is declared in the data modelling phase is transformed to achieve the information flow necessary to implement a business function.

- Application Generation

  Automated tools are used for the construction of the software, to convert process and data models into prototypes.

- Testing and Turnover

  As prototypes are individually tested during every iteration, the overall testing time is reduced in RAD.

9. When to use RAD Methodology?
   1. When a system needs to be produced in a short span of time (2-3 months).
   2. When the requirements are known.
   3. When the user will be involved all through the life cycle.
   4. When technical risk is less.
   5. When there is a necessity to create a system that can be modularized in 2-3 months of time.
   6. When a budget is high enough to afford designers for modelling along with the cost of automated tools for code generation.

10. Advantages:
    1. Flexible and adaptable to changes.
    2. It is useful when you have to reduce the overall project risk.
    3. It is adaptable and flexible to changes.

4. It is easier to transfer deliverables as scripts, high-level abstractions and intermediate codes are used.
5. Due to code generators and code reuse, there is a reduction of manual coding.
6. Each phase in RAD delivers highest priority functionality to client.
7. With less people, productivity can be increased in short time.

11. Disadvantages:
    1. It can't be used for smaller projects.
    2. Not all application is compatible with RAD.
    3. When technical risk is high, it is not suitable.
    4. If developers are not committed to delivering software on time, RAD projects can fail.
    5. Reduced features due to time boxing, where features are pushed to a later version to finish a release in short period.
    6. Reduced scalability occurs because a RAD developed application begins as a prototype and evolves into a finished application.
    7. Requires highly skilled designers or developers.

12. Diagram:

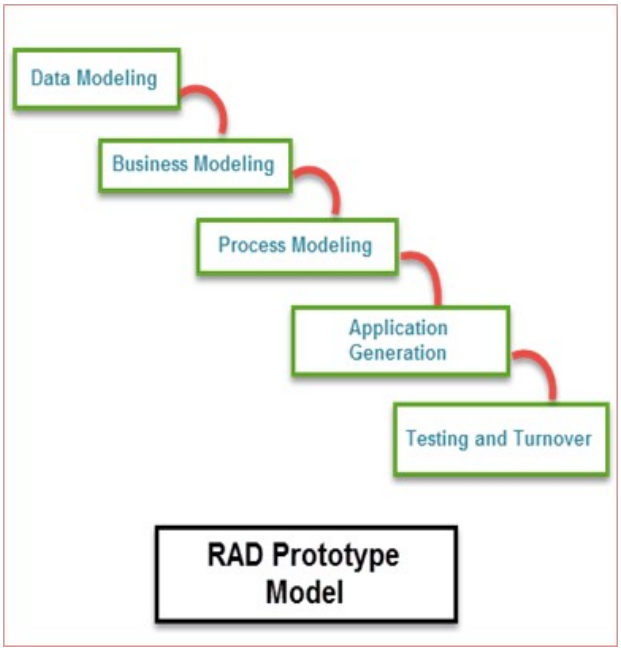

Fig.1.3 RAD Model.

- **Prototyping Model:**

In this model, a prototype of an end product is first developed, tested and defined as per customer's feedback repeatedly till the final expectable prototype is achieved. The intension behind creating this model is to get actual requirements more deeply from the user.

13. Process of Prototyping:

1. Initial requirement identification.
2. Prototype development.
3. Review.
4. Revise.

14. Advantages:

1. The customer gets to see the partial product early in the life cycle.
2. Missing functionality can be easily figured out.
3. Flexibility in design.
4. New requirements can be easily accommodated.

15. Disadvantages:

1. Costly with respect to time as well as money.
2. Poor documentation due to continuously change in requirements.
3. After seeing an early prototype, the customer demands the actual product will be delivered soon.

16. Diagram:

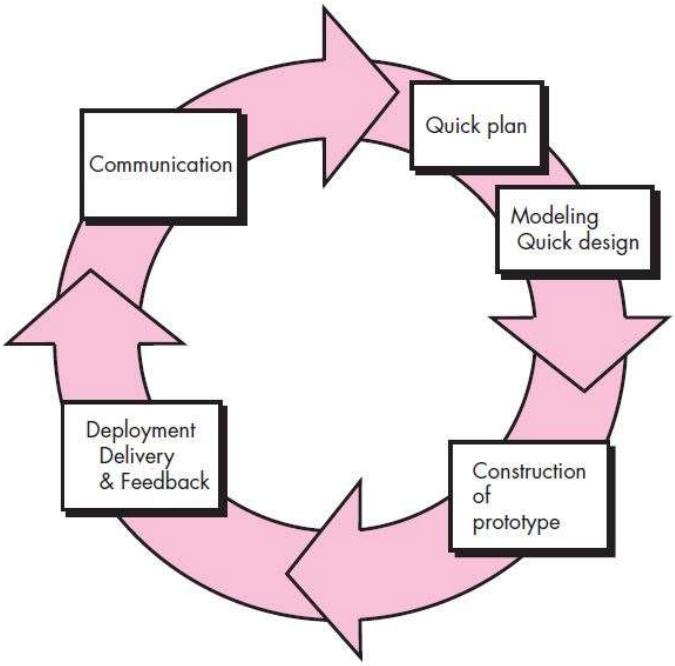

Fig.1.4 Prototype Model.

- **Spiral Model:**

The Spiral model was proposed by Barry Boehm. The Spiral model is the combination of Waterfall model and Incremental model. The Spiral model is divided into 4 task regions. Each task region begins with the design goal and ends with the client reviewing. Software is developed in the series of incremental release. The task region of Spiral model is:

1. Concept Development.
2. System Development.
3. System Enhancement.
4. System Maintenance.

17. Features:

1. When the release is frequent this model is used.
2. Used for large projects.
3. Compatible even if requirements are complex and unclear.
4. Changes can be done at any time.
5. When risk evaluation is important Spiral model is used.

18. Advantages:

1. Additional functions or changes can be done at later stage.
2. Cost estimation becomes easy.
3. There is always space for customer's feedback.
4. Development is fast and features are added in systematic way.

19. Disadvantages:

1. Documentation is more as it has intermediate phases.
2. It is not advisable for smaller projects, as it may cost them a lot.

20. Diagram:

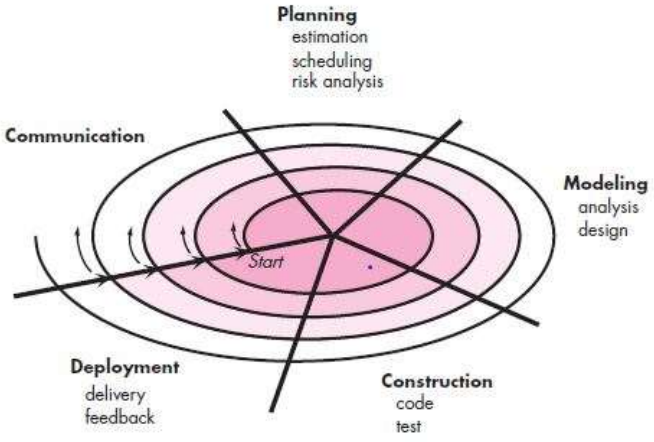

Fig. 1.5 Spiral Model.

- **Scenario: "Online communication/ chatting web application"**

- **Questions:**

1. **Which model will you use?**

   I will use the Incremental Model.

2. **Why this model? Elaborate.**

- The Incremental Model's main focus is on breaking down the software into multiple modules of software development life cycles
- Incremental development is done in steps from communication, planning, modeling, construction to deployment. Each iteration passes through all the five phases and after each iteration, an updated version of application with added functionalities is provided to the client. This process continues till all the designed functionalities have been implemented.
- We will choose this model for software development because the client wants the operational/working software faster and is ready to accept a working initial product too.
- Also by choosing this model we get the advantage of being able to consider the customer response and feedback after each increment is made to the product and then make the adequate changes.
- The testing and debugging process of this model will be simpler as the previous versions would be already tested and thus we won't have to test the whole project again and again.
- By using Incremental model , we will also be able to make this project more flexible and adaptable to future changes and the process of risk management will also become easier.

- Hence, I chose the Incremental model for the development of the ‘Online communication / chatting web application’.

- **Conclusion:**

  Hence, by performing this experiment I learnt about the concept of software development process and the various types of software development models, also I learnt the various pros and cons of the software models and which model to use in the given scenario based on the client’s needs.

(10)	(20)	(10)	(10)	Total (50)