SOFTWARE ENGINEERING

PROJECT REPORT

Project Title
Online LHC room booking system.

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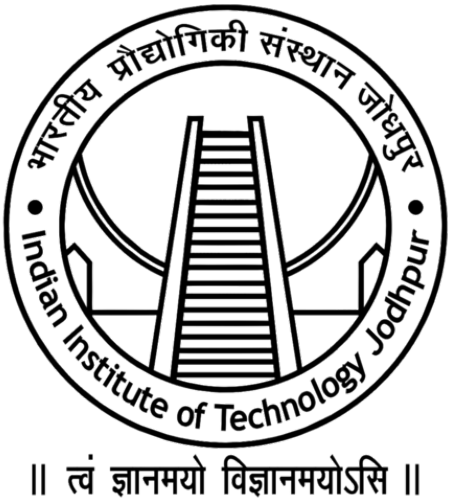
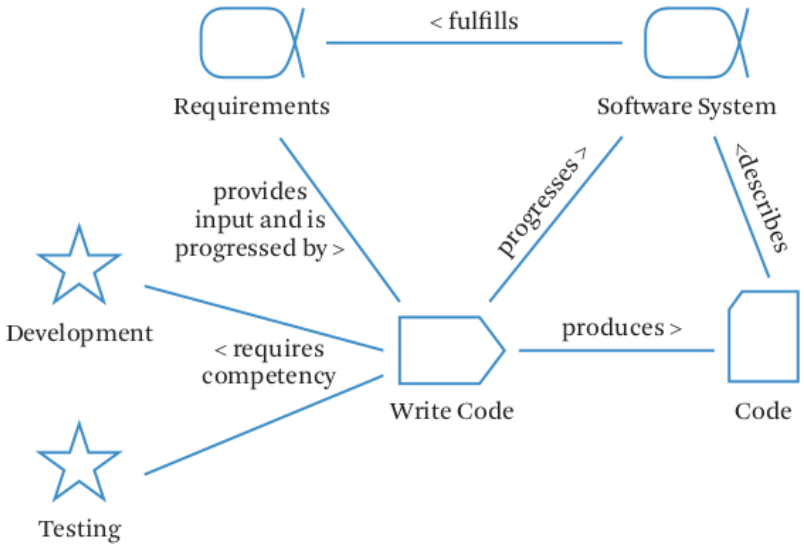
Document Type
Essence kernel and Additional practices



DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
IIT JODHPUR

Essence Kernel and Essence based Practices

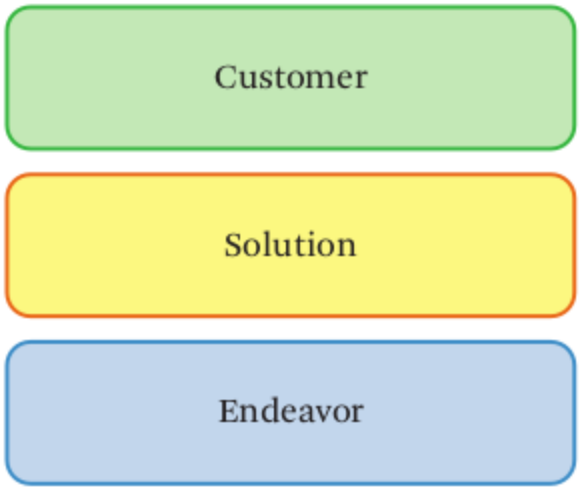
What is essence kernel and its alphas and how we used it in our course project



Programming Practice using essence language

Essence kernel is a set of essence elements that would always be found in all types of software system endeavours. Essence is the mixture of the essence kernel and the essence language. Essentialised methods uses essentialised practices which uses essence kernel which ultimately uses essence language to form an essence.

There are three major areas of concern which contain all the alphas, and activities of the essence kernel which are:



- Customer: This area of concern contains everything to do with the actual use and exploitation of the software system to be produced.
- Solution: This area of concern contains everything related to the specification and development of the software system.
- Endeavor: This area of concern contains everything related to the development team and the way that they approach their work.

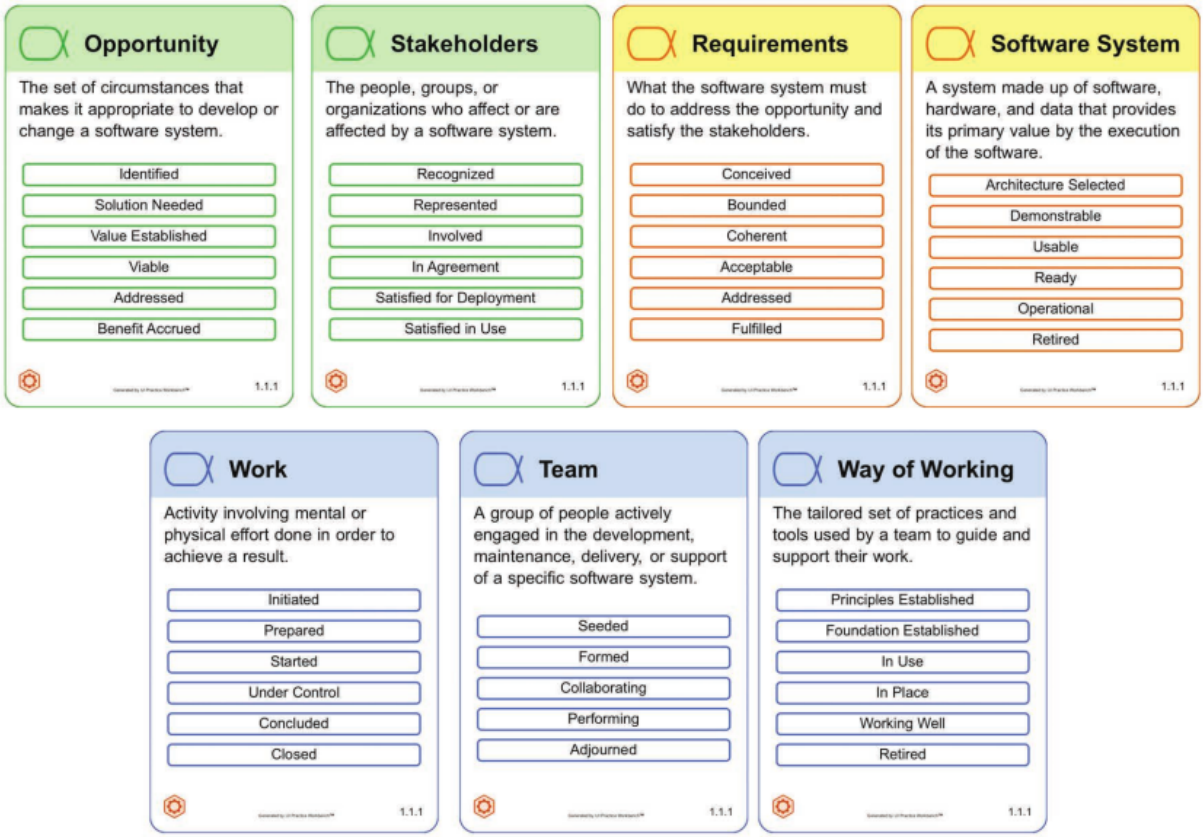
The necessary alphas related to this are: Opportunity, Stakeholder, Requirements, Software System, Work, Team and Way of Working.

- In the Customer area of concern, we need to understand the stakeholder's needs and the opportunity to be addressed.
- In the Solution area of concern, we need to establish a shared understanding of the requirements, and then implement, build, test, deploy, and support a software system that fulfills them.
- In the Endeavor area of concern, we and its way of working have to be formed, and the work has to be done.

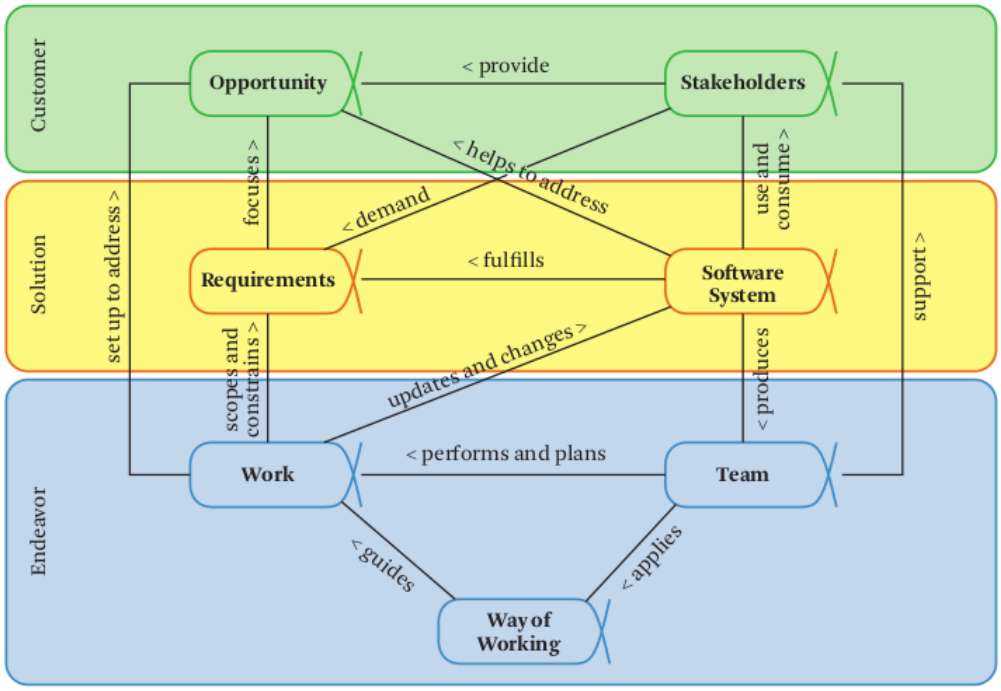
NOTE: We had taken all the standard alphas defined in the essence kernel inorder to keep track of our project and also we had followed the above defined activities spaces of the three areas of concern for our project.

Here are all the listed alphas cards along with their states. These alphas states are essential for the development team and the stakeholders to keep a track of the progress of the project. There are various essence games methods which are played by the team and

the stakeholders in order to find out the exact state of the project so that the future planning can be done accordingly. Each of the states of alphas has a separate card which contains certain checkpoints and all the checkpoints should be ticked in order to mark that state as complete.

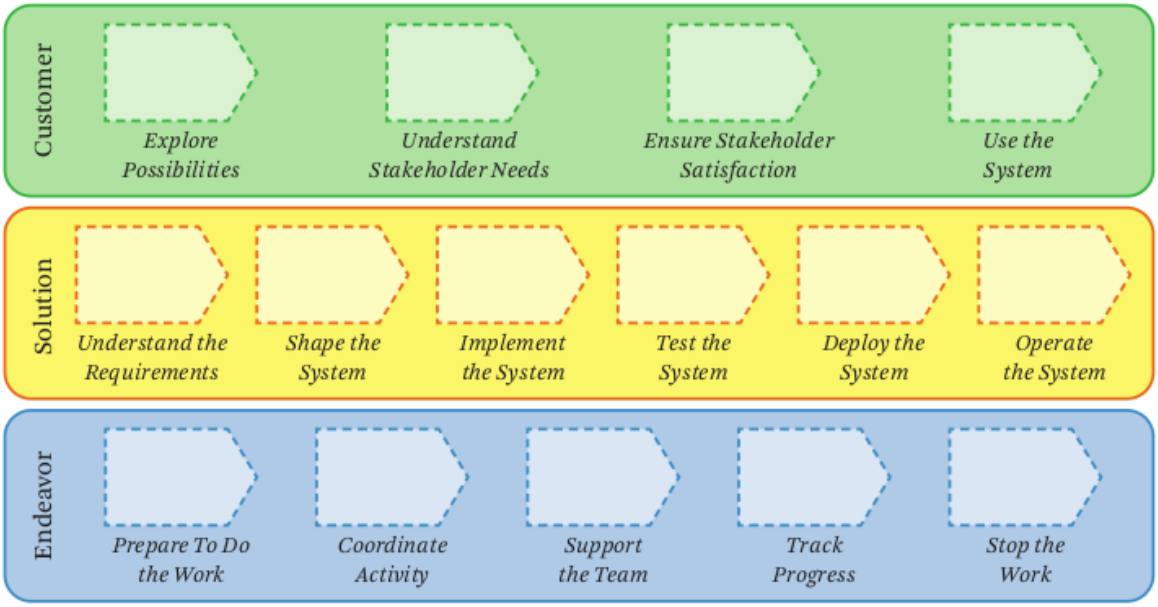


These all alphas are related as follows in their area of concern of the essence kernel. This is a diagrammatic view which shows the relationship between the alpha and the sequence in which they are executed and provides the guidance to the development team on how the things to be done in each step as the team marches toward achieving the states specified in the alphas.



In every development endeavor, we need to carry out a number of activities. Examples of activities include agreeing on a user story with a product owner, demonstrating the system to a customer representative, and estimating work. Essence as such does not define any activities on how any team goes about capturing and communicating the requirements. However, Essence defines a number of activity spaces which can be thought of as generic placeholders for specific activities. The activity spaces are packages used to group activities that are related to one another. This helps to keep them organized, which in turn makes them easier for the developers to find and use when they face common challenges where a practice could help.

The following activity spaces provide guidance to us on the things to do in each of the three areas of concern as we march toward achieving the states specified in the alphas.



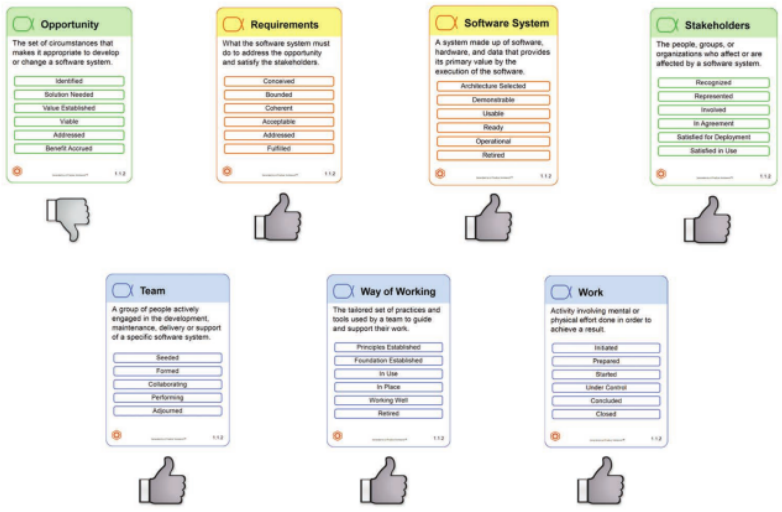
Identification of alphas state

In order to check the status of our project we have to apply some of the methods to identify the states of alphas of our software. Here are some of the games played in essence based practice to identify the same :

- **Progress poker-** All the stakeholders are given the states of alpha cards in which there are various checkpoints. These checkpoints lead to deciding the state of any alphas in our software project. If more than one state is identified by the stakeholders and they don't reach the conclusion then the game is played again until conclusion is reached.

Tools needed to play Progress Poker (alpha card and alpha state cards).

- **Chasing the state-** The stakeholders decide the achieved state of the alphas by putting all the states of alphas card on one side and then sliding the achieved alpha cards to the other side.
- **Objective go-** The stakeholders decide the achieved state of the alphas by putting all the achieved states of alpha cards on one side and unachieved alpha states cards on the other and the next goal to achieve in the middle.
- **Checkpoint construction-** All the stakeholder decide the checkpoints alphas by discarding the alphas in various rounds. They use a thumbs up or thumbs down to agree and disagree.



NOTE: For our course project we had decided to use the chasing the state and objective go to find the states of the alphas as the team member is limited to two.

What are these games and how we modified these games so that we can perform them in online mode

Chasing the State

In this game all the alphas are placed on one side of a table and all corresponding states of that alphas are placed on the other side of the table. There is a discussion among the stakeholders and the team members in order to decide the state for each alphas and those states which are achieved are slides towards the left side of the table as shown in the figure.

Figure 8.8 The current states for all alphas have been identified.

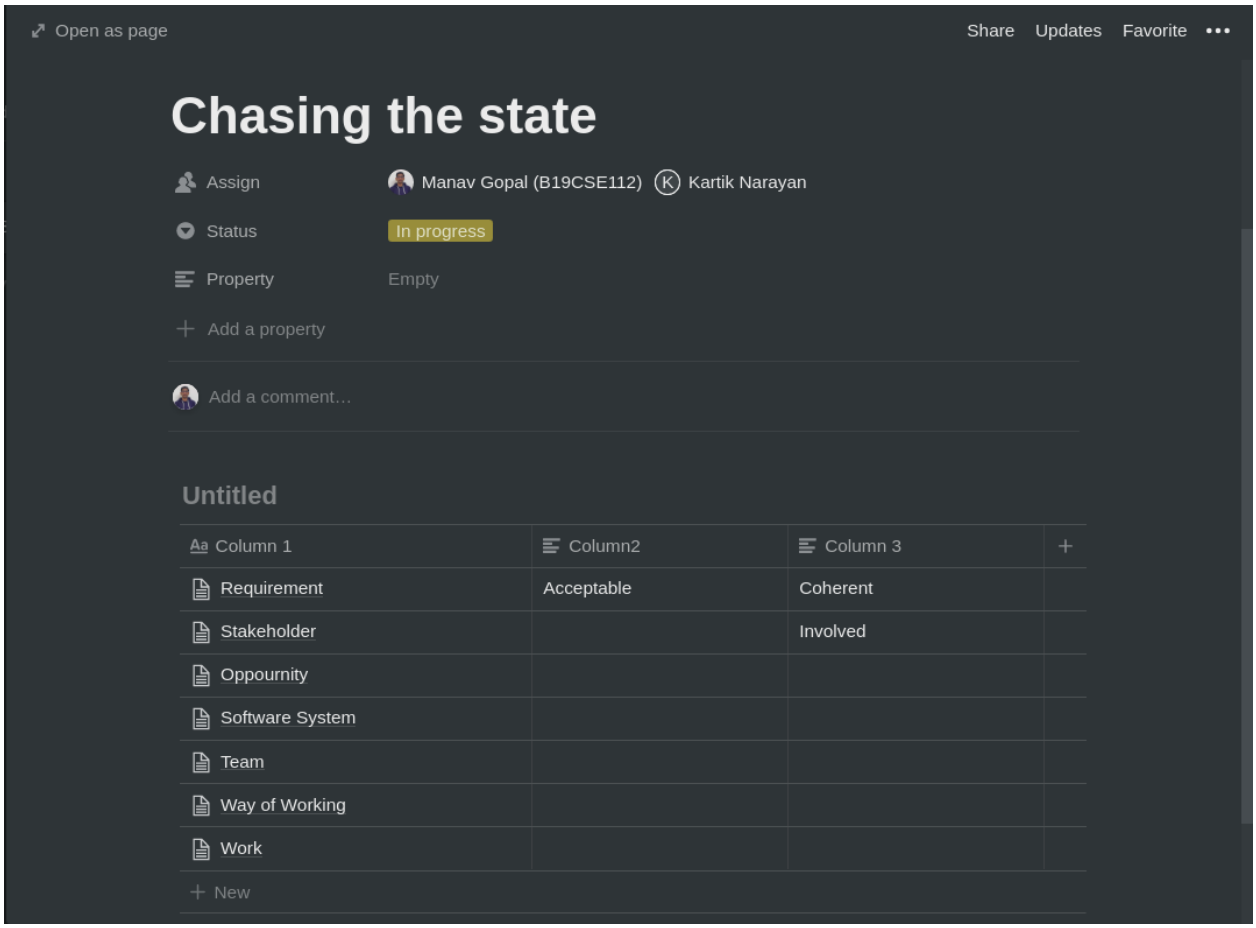
Objective Go

This game is almost the same as chasing the state.In this game all the alphas are listed to the left side and all the states along right side and then the states achieved are moved towards the left same as chasing the state but now the team decides the next objective state for the chosen alphas after the discussion and the states of the alphas are placed in middle of the table as shown in the figure.

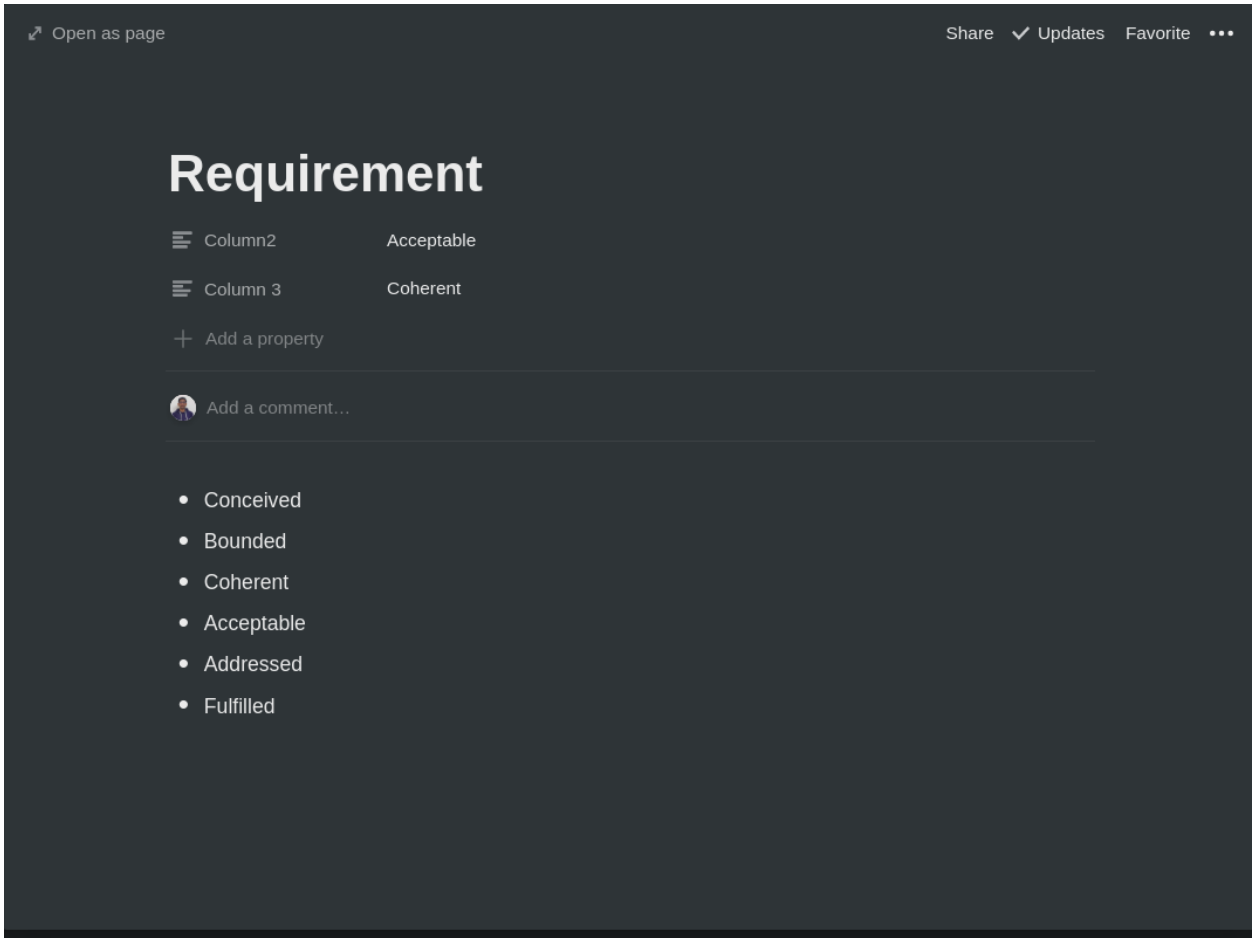
The modified strategy to play this game

- We organised a meeting on google meet in order to discuss and then one of us shared his screen and then we opened notion tab having three columns in which first column represent the right of the table and the last column represent the left of the table and the middle column represent the middle of the table in which we were putting the states which we want to achieve next (in the objective go).
- We put all the states of a particular alphas in the left column in the beginning and then decided the achieved state for that essence alpha by discussing the checklists and then put that thing in the last column in the chasing the state and the next goal for the decided alphas in the second column for the objective go.

Here are the screenshots of the same



On clicking on any of the alphas a new file is opened in which all the states are mentioned. On the top there are two columns representing the next state to be achieved(column 2) and the achieved state(column3).



Essentialised practices

There are 4 types of standard Essence practices of which we have chosen the scrum based practice for our project.

Practice	Description	Things to Watch (alphas)
Scrum	A practice for the iterative development of software systems working off a backlog.	Sprint Product Backlog Item
User stories	A way to capture functionality that will be of value to a user of a software system.	User Story
Use cases	All of the ways of using a system to achieve a particular goal for a particular user.	Use Case Use Case Slice
Microservices	A software architecture style that uses small independent processes to communicate.	Microservice

NOTE: As we have to choose one of the essence based practice for our course project so we had decided to run scrum based essence practice for our project.

What is scrum and how we modified it to perform in online mode

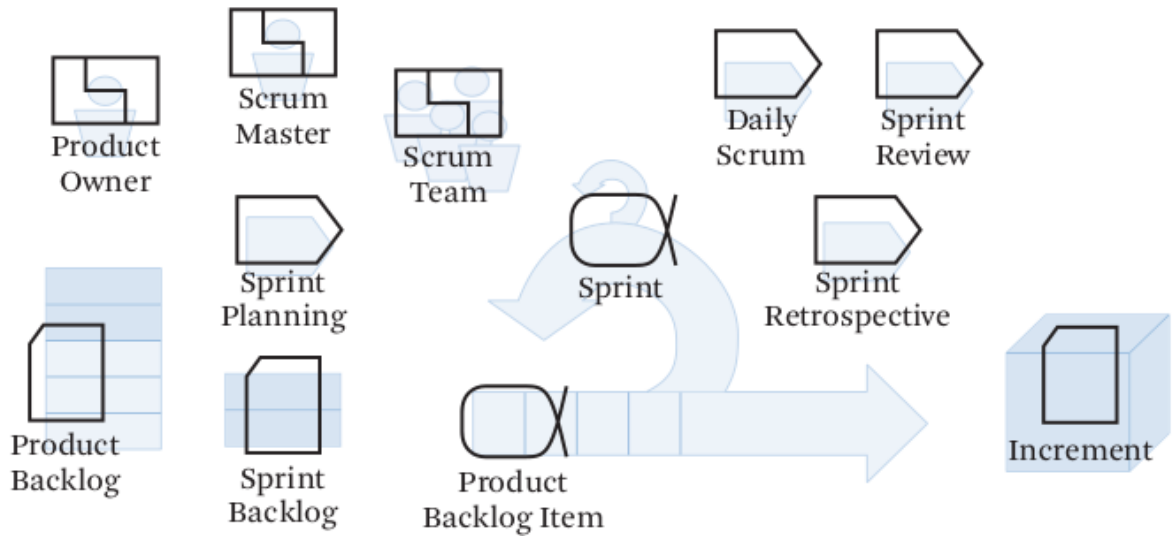
Scrum is a practice for iterative development where each iteration, or time-box, is called a sprint. The sprint is an alpha, something we need to watch. Scrum guides teams to complete work items in a backlog. These work items, known as Product Backlog Items (PBIs) using Scrum terminology, can also be treated as alphas.

The various components of scrum based practices are:

- Product Owner- Organises the PWIs so that it is easily understandable by the team members.
- Scrum Master- Organises the scrum in such a way that it is understandable to all
- Scrum Team- Delivers the product iteratively.
- Sprint Planning-The PBIs to be performed in a sprint are selected through the sprint planning activity where the team, together with the product owner (PO), agrees on the highest prioritized PBIs to be worked on.
- Sprint Backlog- Set of PWIs selected for sprint.
- Sprint-The heart of Scrum is the sprint, a fixed-length period of time, usually one to four weeks, during which the team meets a certain goal, which includes producing a potentially shippable increment of the product to be developed.

- Daily Standup- A short daily meeting to discuss the scrum sprint and the work to be done at that day and backlogs of the previous day.
- Sprint Review- Time boxed review of the outcome product of sprint.
- Sprint Retrospective- Management, whether the team is doing well or not.
- Potentially Shippable Increment- Output of the sprint run called as complete PWIs.
- Product Backlog-The product backlog is maintained with the most important items near the top of the list.
- Product Backlog Item- The things in the product backlog are called Product Backlog Items (PBIs).A PBI can be a piece of a requirement, something the team can do to improve themselves, or defects that they will have to fix.

Alphas- Sprint and Product Backlog Item.
Pattern- Product owner, scrum master and scrum team.
Work product- Product Backlog, Sprint Backlog and Increment.
Activity- Sprint Planning, Daily Scrum, Sprint review and Sprint Retrospective



The modified essence based Scrum we followed for our course project

- We decided to organise three meetings per week on google meet(monday,wednesday,friday) and, in each of the meetings we discussed the development of our project, the current status, the backlog from the previous scrum meeting and what is our next goal.

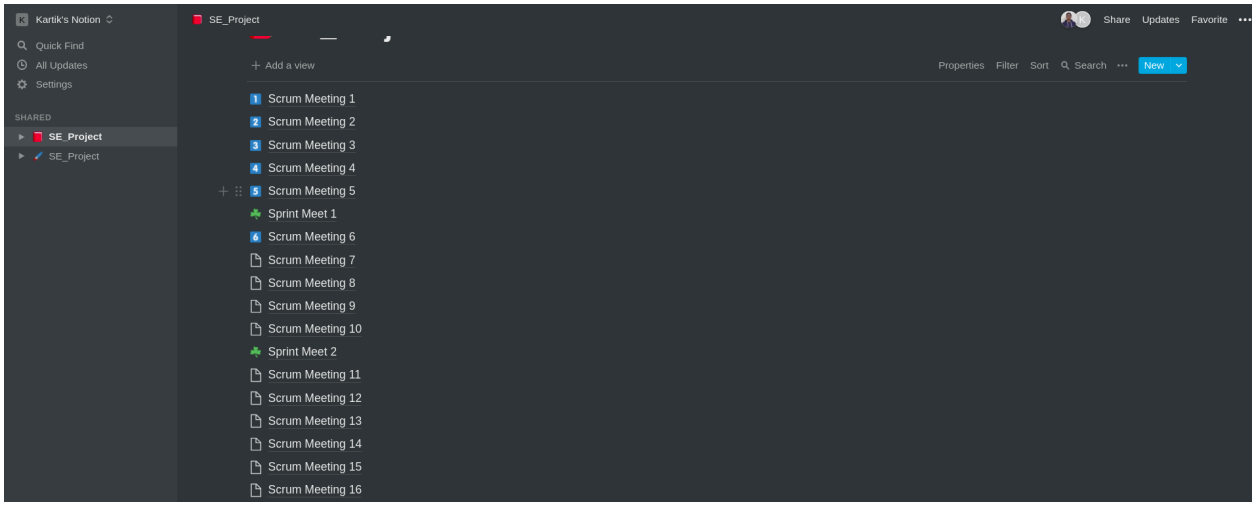
- We review our all three overall meetings by organising a short meeting at the weekends(generally sunday).
- As the team has only two members so for the roles of product owner and scrum master, both of us took the roles for each of the roles and the scrum team consists of both of us.
- We decided to perform a sprint on bi-weekly basis. Before the sprint run, sprint planning is done by organising a short meeting on biweekly basis and after the sprint is complete a meeting is again organised for the sprint review.
- For the sprint retrospective part we decided to have a check on each other and review each other's work in the scrum meeting we decided to organise 3 days a week.
- As the team size for this project is small (only two members) so we had decided to decide the states of any alpha by chasing the states and objective go essence game methods for our software project.

Discussion topics during the meeting

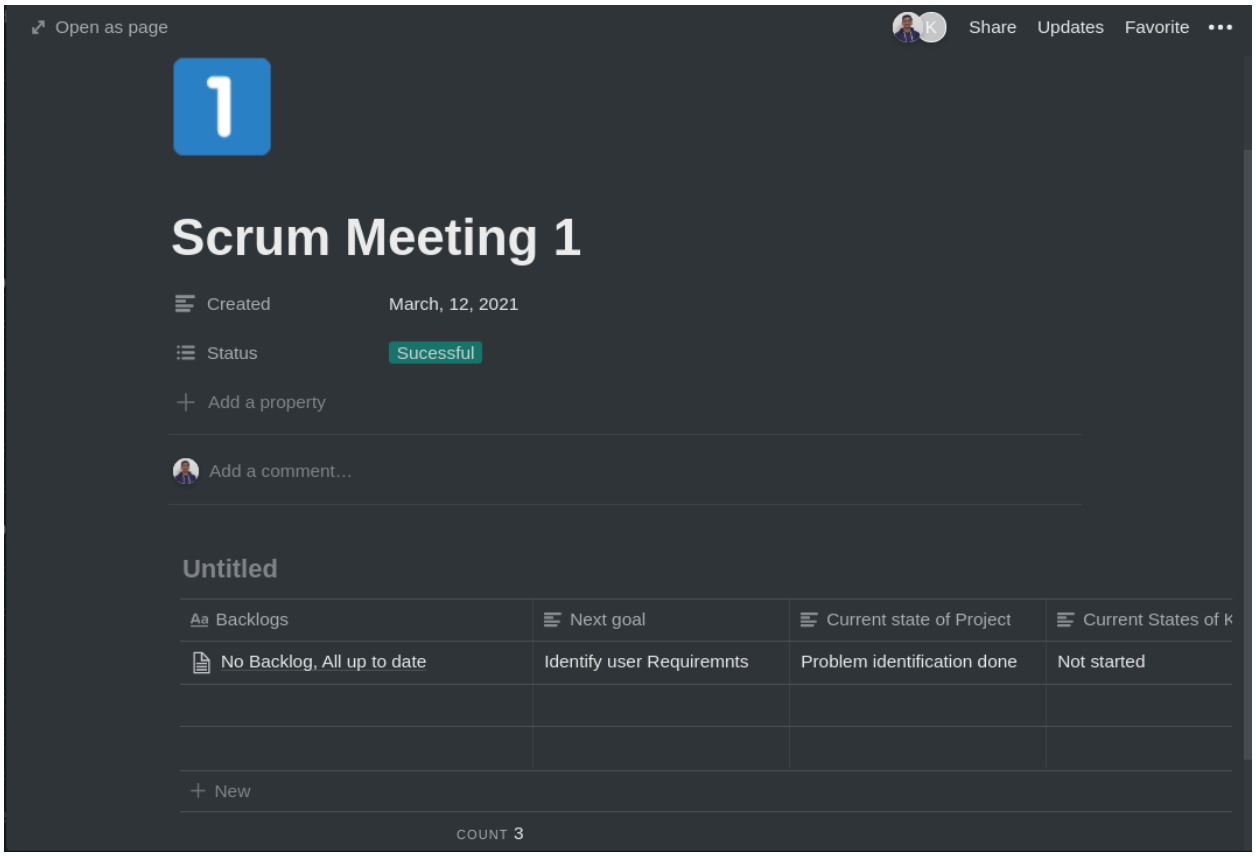
- Identification of backlog.
- Current states of the project.
- current state of the kernel alphas.
- Future planning, what to do next?
- Goal for next meeting.
- Sprint planning before sprint.
- Review of the sprint performed.
- Review each other's work.

Here is the notion image which shows our scrum meeting works , the same is followed during the entire project period.

This is the table of all the meetings organised by us during the project while following the scrum. In the screenshot it can be seen that after every 5 scrum regular meetings a Sprint meet is organised in which we discuss about the sprint that ran and what are the states of the alphas and backlogs.

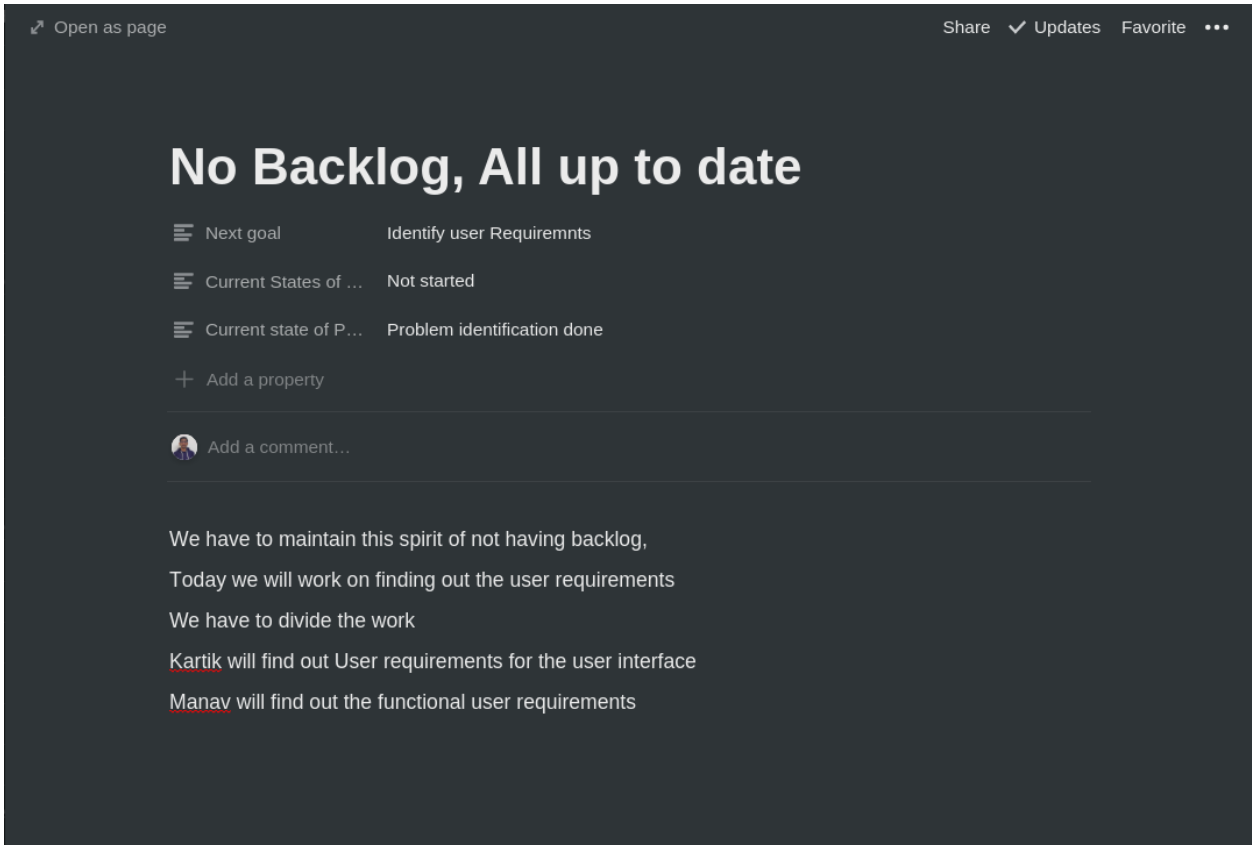


Here is the MOM of the first scrum meeting organised. The MOMs are made by any of the team member which changes in every meeting.

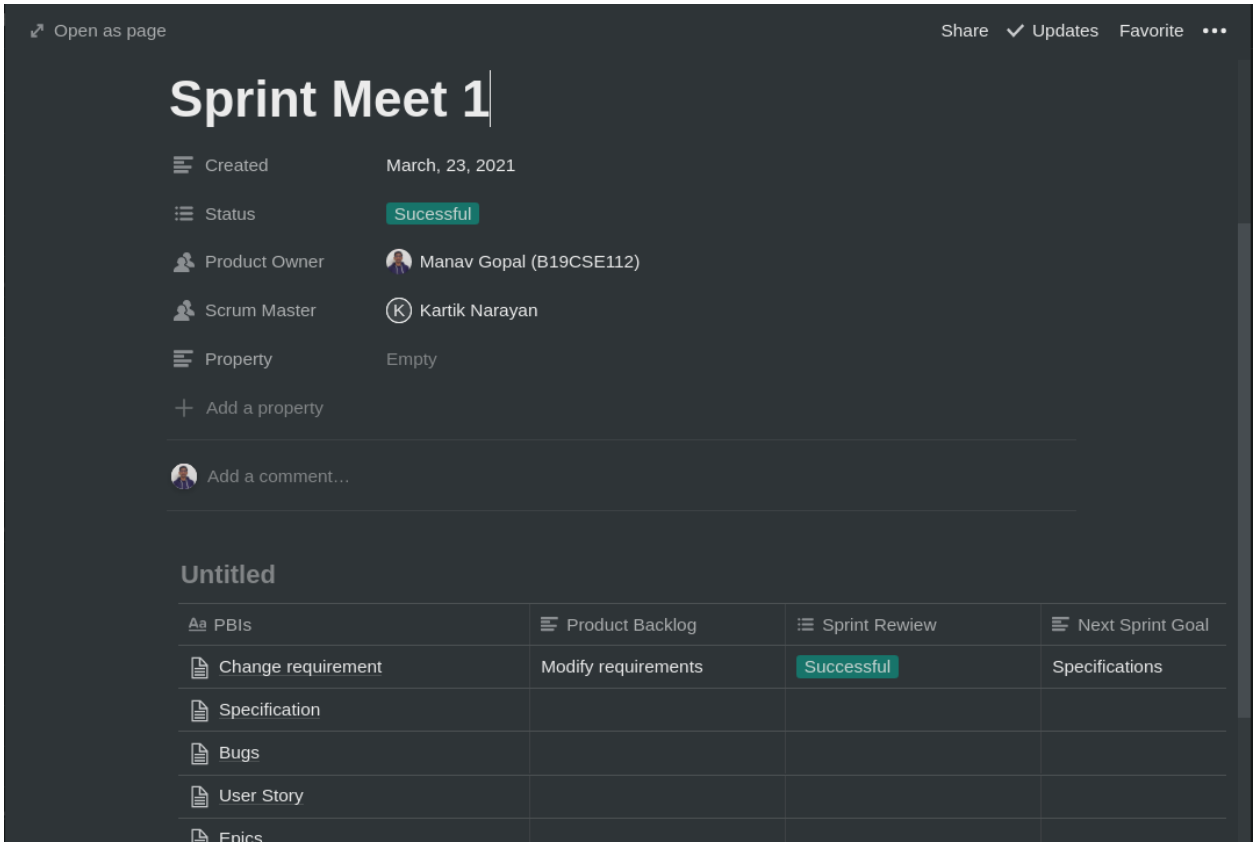


Here it is shown that there are no backlogs for this meeting and everything is up to date. The current state of the project is Problem Identification done and next goal is Identify

user requirements which can be seen in the screenshot also, we write the discussed point in that meeting. Making the MOM is done on an alternate basis.

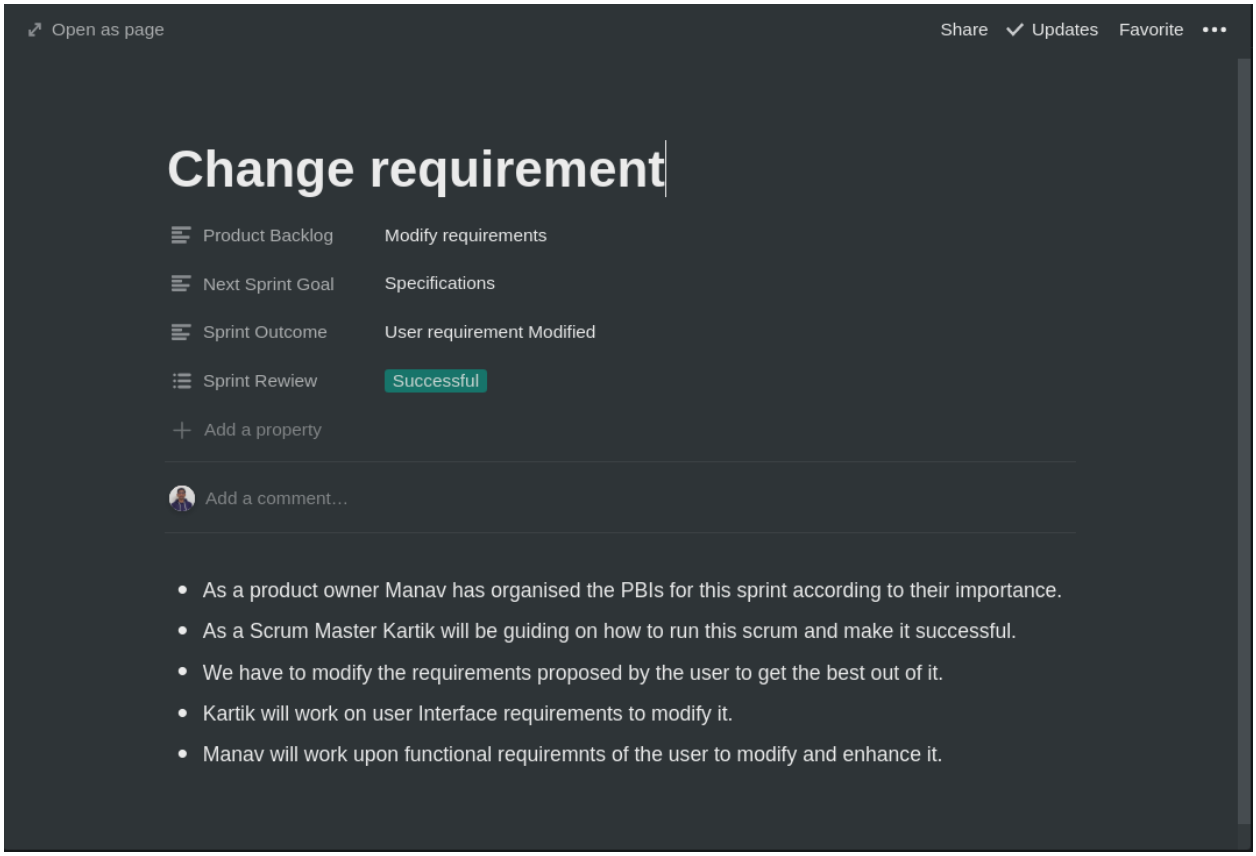


Now here the notion workspace screenshot for the Sprint meeting, for the first meeting the PBIs are Change requirements, Specifications, User Story, Bugs and Epics and as a product owner Manav had arranged all these PBIs according to the priority and as a scrum master Kartik guided how to run the sprint and what to do.



On clicking on the first PBI, the change requirement, the whole summary of that sprint can be viewed like, on what item scrum is being run, who is the product owner, who is the scrum master,what is the next sprint goal, what is the outcome of the sprint and whether the sprint is successful or not by adding a label in sprint review column. In this doc file all the main meeting points are listed as shown in the screenshot below.

We had run all the sprints in the similar way as described and organised all the meetings as shown and described on the decided three days of a week.



Additional Practices

SDLC model

We decided to follow a mixture of waterfall and big bang model for our project software development life cycle mainly because of the reason that our project is small and these two are perfect models for small projects.

- Requirement Gathering and analysis − All possible requirements of the system to be developed are captured in this phase and documented in a requirement specification document.
- System Design − The requirement specifications from the first phase are studied and the system design is prepared. This system design helps in specifying hardware and system requirements and helps in defining the overall system architecture.

- Implementation − With inputs from the system design, the system is first developed in small programs called units, which are integrated in the next phase. Each unit is developed and tested for its functionality, which is referred to as Unit Testing.
- Integration and Testing − All the units developed in the implementation phase are integrated into a system after testing of each unit. Post integration the entire system is tested for any faults and failures.
- Deployment of system − Once the functional and non-functional testing is done; the product is deployed in the customer environment or released into the market.
- Maintenance − There are some issues which come up in the client environment. To fix those issues, patches are released. Also to enhance the product some better versions are released. Maintenance is done to deliver these changes in the customer environment.

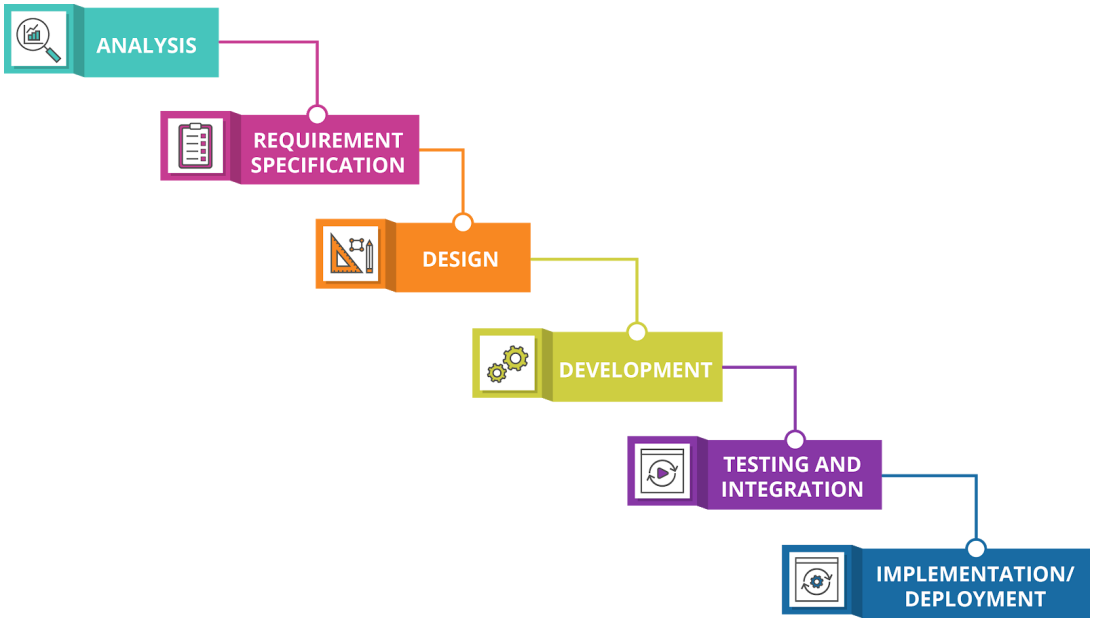
How we followed these models

Following the waterfall model we implemented all these processes in a sequential way one after another as defined in the model as it is easier for the small project to go step by step and also it is good for the beginners as this provides a very simple and understandable path to be followed.

In some of the cases we followed the big bang model in a way that, according to the ease of writing and understanding code, we had developed and done those things first which are easier to do and in this way we followed the big bang model theory of not following any certain steps and doing things according to the requirements. Sometimes it also happens that it is required that we have to forcely develop any certain module in order to run other modules so things get randomised in this way leading to a big bang life cycle.

Why do we decide to follow this model

- Waterfall model is good for small and short projects where requirements are very well understood.
- Technology of this model is easy to understand and is not dynamic.
- It is easy to manage due to the rigidity of the model.
- It has clearly defined stages and easy to arrange tasks.
- Process and results are well documented for this model.



- In the big bang model we do not follow any specific steps so it is sometimes good for the small projects and beginners where they can perform those tasks first which they feel is easy to design and develop.
- The development just starts with the required money and efforts as the input, and the output is the software developed which may or may not be as per customer requirement.

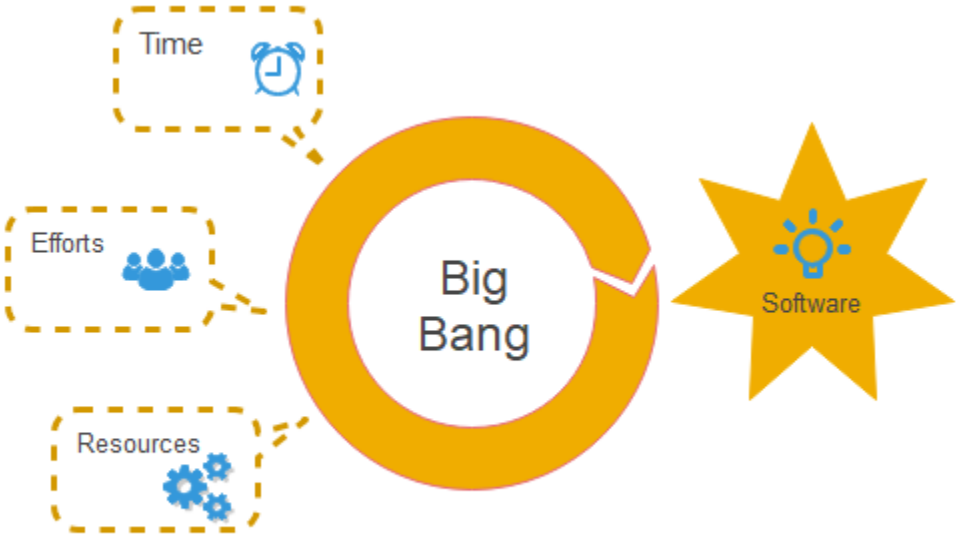


Fig. Big Bang Model

Thanking You
Course instructor - DR. Sumit Kalra