

⇒ Debugging Web Service

* Involves identifying, and resolving issues that may arise during the development, testing or deployment of the service.

* Process of fixing the bugs in the software.

* Refers to analysing and removing errors.

* Steps involved in debugging:-

1. Problem identification and report preparation
2. Assigning the report to the software
3. Analysing the problems
4. Making required changes
5. Validating the changes

* Debugging Approaches:-

1. Brute Force → Study the system for a longer duration and making analysis of the problem.
2. Backtracking → Tracing the problem in the backward direction from the location of failure msg in order to identify region of faulty code.
3. Forward analysis → Tracing the problem forward using breakpoints or print statements at different points and studying the result.
4. Using past experience → Debugging with the approach of debugging similar problems that have been done in the past.

* Debugging tools

- Radare2

- Immunity

- Windbg

- Valgrind

⇒ Difference b/w Debugging and Testing:-

- | Debugging | Testing |
|---|---|
| * Process of identifying and validating the software resolving issues or bugs in against requirements software. | |
| * Done after the code is written. | Can be done at any stage of software development. |
| * Debuggers respond to issues reported by users. | Testers try to find the issues. |
| * Involves examining of code and resources to identify the cause of issue. | Involves executing the software to find issues. |
| * Involves fixing of issues. | Involves reporting of issues. |
| * Done by debuggers or developers. | Done by testers, or developers. |

⇒ UI → User Interface

- * Refers to graphical layout and elements that enable users to interact with software.
- * Includes all the components that the user sees and interacts with, such as buttons, forms, etc.
- * A well designed UI can improve the user experience, reduce errors.

* Significance of UI:-

1. A good UI makes user interaction simple and efficient.
2. Helps establishing brand identity
3. Helps improving efficiency.
4. Enables user to access platform and perform tasks.
5. A good UI helps in providing competitive advantage.

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=> Advantages of UI:-

1. Improves user experience
2. Increase user adoption by making it attractive
3. Establish branding identity
4. Reduce development time
5. Improve efficiency and productivity of users.

=> Disadvantages:-

1. Can be expensive
2. UI designing is a time consuming process.
3. Requires high maintenance.

=> Types of UI:-

1. GUI (Graphical User Interface)
2. Command Line Interface
3. Menu Driven Interface
4. Form Based Interface
5. Natural Language Interface

=> GUI → Graphical User Interface

- * Uses visual representations such as buttons, menus, etc.
- * Allows users to perform tasks by pointing or clicking with mouse.

* Characteristics :-

1. Includes visual elements
2. Tasks can be performed by pointing or clicking with mouse.
3. Provides visual feedbacks to users
4. Easy to learn and use.

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* Advantages :-

1. User friendly
2. Performs tasks quickly and efficiently.
3. Better navigation options
4. Attractive designs
5. Visually appealing and engaging.

* Disadvantages :-

1. Limited functionality
2. Requires more memory and processing power
3. Difficult to customize for different users.
4. Difficult to modify
5. Can be expensive.

=> CLI → Command Line Interface

* Type of user interface

* Allows user to interact with software application by typing commands using keyboard.

* Characteristics:-

1. Requires commands to interact with software.
2. Outputs in text based format
3. Specific syntax for commands
4. No visual elements.

* Advantages :-

1. More control over system
2. Requires less memory and processing.
3. Customizable
4. Can be used on different platforms.

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* Disadvantages:-

1. Error prone as typing mistakes may occur.
2. Limited access.
3. Not user-friendly.
4. User need to learn specific commands.

⇒ Difference b/w GUI and CLI:-

GUI

CLI

* Easy to Use	Difficult to Use
* Consumes more memory	Consumes low memory.
* Low precision	High precision
* Needs both mouse + keyboard	Needs only keyboard.
* Input only at command prompt.	Input can be anywhere on screen.
* No commands need to be learnt.	User need to learn specific commands.
* Graphics are used.	No Graphics are there.
* Uses pointing devices	Do not use pointing device.

⇒ Menu Driven Interface

- * Commonly used on cash machines or ticket machines.
- * User needs to select the menu given on the screen only.
- * Characteristics:-

 1. Menu-based
 2. Follows a hierarchical structure
 3. User can navigate using arrow keys or mouse.
 4. Limited inputs

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⇒ **Advantages:-**

- * Easy to learn and use
- * Reduced errors
- * Consistent user experience

⇒ **Disadvantages:-**

- * Limited flexibility
- * Limited functionality
- * Slow Navigation

⇒ **Form-based Interface**

- * Presents information to user in the form of fillable form
- * User interacts by filling data in input fields.
- * Commonly used in data entry applications.

* **Characteristics:-**

1. Forms
2. Input fields
3. Validation of data
4. Feedback in form of msgs.

* **Advantages:-**

1. User-friendly
2. Accuracy of data
3. Standardize inputs

4.

⇒ **Disadvantages:-**

1. Limited functionality
2. Not visually appealing
3. Time consuming

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⇒ Natural Language Interface

- * Allows user to interact with the system using natural language.
- * User can communicate with the system.
- * Example: Alexa, Google Assistant, Siri

* Characteristics:-

1. Uses natural language
2. Mimic a natural conversation
3. Interface understand's users language input.
4. Provides feedback in natural language.

* Advantages:-

1. More intuitive and user friendly
2. Faster
3. Flexible

* Disadvantages:-

1. Not suitable for complex tasks
2. Language Barriers
3. May lead to misunderstandings and errors.

⇒ Android UI layout

- * Arrangement of UI elements such as text, images,
- * Determines visual appearance and organization of the elements.
- * Creating a user-friendly app

* Types of layouts:-

1. Linear Layout → Elements arranged in one direction horizontally or vertically.
2. Relative Layout → Used to specify position of elements relative to each other or relative to parent element.
3. Constraint Layout → Similar to Relative layout but have more power. Specify positions of layout constraints for every child view, relative to other views present.
4. Android Frame Layout → Similar to a frame position of each element on top of each other to display only a single view.
5. Table Layout → Display elements in rows and columns.
6. Web View → To display web pages in activity layout.
7. List View → Scrollable list of items in single column.
8. Grid View → Scrollable list of items in rows and columns.