**Java – Backend Assignment**

**★ Module 1– Overview of IT Industry**

1. **Explain in your own words what a program is and how it functions.**

**● Program is a set of instructions, that tell computer to what to do. This instructions are given using different programming language like using python or java etc.**

1. **What are the key steps involved in the programming process?**

**● Process to give a programm or instruction**

**● Key steps in programming process:-**

1. **Planning or understand algorithm**
2. **Analysis the process or solving problems**
3. **Coding or implementation**
4. **Testing the program**
5. **Deployed**
6. **Maintenance and update**
7. **What are the main differences between high-level and low-level programming languages?**

**● high level and low level:-**

|  |  |  |
| --- | --- | --- |
| **●** | **High level** | **Low level** |
| **Understanding** | **Easy to read and write** | **Hard to understand** |
| **Example** | **Python, java, c++** | **Machine code** |
| **Portability** | **Can run on different systems** | **Tied to specific hardware** |
| **Speed** | **Slower (needs to be translated)** | **Faster (directly intract with hardware)** |
| **Use** | **Use for app or web level devlopment** | **Used for hardware level programming** |

1. **Describe the roles of the client and server in web communication**

**● client and server in web communication**

1. **Client**

**> client is the user’s device like smartphone, computer etc**

**> it initiate the request to the web server when intrested**

**> doesn’t communicate with other client and needs to know server address**

**> example if I write [www.google.com](http://www.google.com) in browser then browser is client sending request to server**

1. **Server**

**> server is like powerful computer that stores data, websites and files**

**> it responds to request made by client**

**> example like google’s server receives the request and sends the google homepage to my browser**

1. **Explain the function of the TCP/IP model and its layers**

**● TCP/IP model functions:-**

**● breaks data into smaller packets for easy transfer, it ensures data travels from one computer from another computer safely**

**● TCP/IP model layers:-**

**● application layer - deals with user level service e.g. HTTP**

**● transport layer - ensure data is sent correctly in order e.g. TCP (reliable), UDP(fast)**

**● internet layers - finds best path to send data between networks e.g. IP**

**● network access layer**

1. **Explain Client Server Communication**

**● Client**

**> client is the user’s device like smartphone, computer etc**

**> it initiate the request to the web server when intrested**

**> doesn’t communicate with other client and needs to know server address**

**> example if I write [www.google.com](http://www.google.com) in browser then browser is client sending request to server**

1. **How does broadband different from fiber-optic internet?**

**● Broadband is a general term for internet that can be delivered through various methods like: telephone lines, tv cables**

**● Fiber optic is type of broadband that uses thin glass or plastic fibers to transmit data as light signals**

1. **What are the differences between HTTP and HTTPS protocols?**

**● HTTP is used to transfer data between web browser and website, however it is not secure and data can be seen or stolen by hackers**

**● HTTPS does the same job but adds layer of security and this make sure that data sent between user and website is safe and private**

1. **What is the role of encryption in securing applications?**

**● encryption is the process of converting data into a secret code so only two or authorized user can read it**

1. **What is the difference between system software and application software?**

|  |  |  |
| --- | --- | --- |
| **●** | **System** | **Application** |
| **Purpose** | **Manage system and hardware operations** | **Helps user for specific task** |
| **Examples** | **OS ( microsoft, linux ), drivers** | **MS word, paint, games** |
| **Runs on** | **Starts with computer ( background )** | **When user intrested to use** |
| **Users** | **System itself or administrators** | **Used by end users** |

1. **What is the significance of modularity in software architecture?**

**● because it’s easy to devlope, easy to test and if there’s any error in output then it’s easy to find mistakes and teamwork friendly too, different teams can work on different modules**

1. **Why are layers important in software architecture?**

**● it devide the system into separate levels with specific role to make software organized, easy to use and more secure**

1. **Explain the importance of a development environment in software production**

**● a software environment is setup where devloper write, test and debug their codes, it important because it gives everything needed to build software, allows testing before it goes live, helps to find error and problems quickly and speeds up writing and running code**

1. **What is the difference between source code and machine code?**

**● Source code like written by programmers using programming languages like python, java, c, c++ and it is easy to understand but machine code is code the computer actually understand like series of binary numbers like 1 or 0, it is not readable by humans but is directly executed by computer**

1. **Why is version control important in software development?**

**● version control is like tool that tracks changes in code over time, it helps devlopers to manage organize and collaborates on projects**

1. **What are the benefits of using Github for students?**

**● github is platform where you can store, share and colab on code and useful for students bcz we can save code online on free cloud storage and access it anytime**

1. **What are the differences between open-source and proprietary software?**

**● Open source and proprietary**

|  |  |  |
| --- | --- | --- |
| **●** | **Open source** | **Proprietary** |
| **Access** | **Source code is open and visible to everyone** | **Source Code is hidden and controlled by company** |
| **Usage** | **Free to use** | **Required license** |
| **Example** | **Linux, VLC** | **Windows, ms office** |
| **Control** | **User have more control** | **Controlled by the software company** |

1. **How does GIT improve collaboration in a software development team?**

**● it helps work together smoothly on same project, every change is recorded so nothing lost, multiple people can work on different parts at same time..in short git make team work safer and easier in software devlopment**

1. **What is the role of application software in businesses?**

**● storing and analyzing data management like e.g. excel, in communication email and video meetings e.g. zoom, managing sales, in ads e.g. crm**

1. **What are the main stages of the software development process?**

**● planning**

**● analysis**

**● designing**

**● implementation**

**● testing**

**● updates or maintenance**

1. **Why is the requirement analysis phase critical in software development?**

**● analysis phase is where devlopers clearly define what the software should do, it helps the team to know exactly what the client or user need, reduce the chances of building the wrong features**

1. **What is the role of software analysis in the development process?**

**● software analysis is the stage where devlopers study and understand what the software should do before building it**

**● understands the user needs in details**

**● prepare for design**

**● detect issue before coding start**

**● list what software include**

1. **What are the key elements of system design?**

**● architecture design - structure of system**

**● UI design - how user will intract**

**● database design - how data will be stored**

**● component design - designing individual modules**

**● security design - protect the data and system**

**● performance - ensuring the system works well and grow**

1. **Why is software testing important?**

**● software testing checks whether the software works correctly and meets user expectations or not, it’s important so devlopers can catches errors before the software deployed, fixing issue early is cheaper and time saving than fixing them after deployed**

1. **What types of software maintenance are there?**

**● corrective maintenance - fixing bugs or error after software in use**

**● adaptive maintenance - updates the software to works with new hardware or operating system**

**● perfective maintenance - improve performance or adds new features based on feedback**

**● preventive maintenance - makes changes to prevent future problems like optimization**

1. **What are the key differences between web and desktop applications?**

**● web and desktop applications:**

|  |  |  |
| --- | --- | --- |
| **●** | **Web app.** | **Desktop app.** |
| **Access** | **Runs in web browser using the internet** | **Installed and run directly on computer** |
| **Install** | **No installation needed** | **Need to be installed** |
| **Updates** | **Easy to update for all user at once** | **Must update in each device manually** |
| **Internet** | **Usually needs internet** | **May can work offline** |
| **Device** | **Can run on any device with a browser** | **Tied to specific operating system e.g. windows, macOS** |

1. **What are the advantages of using web applications over desktop applications?**

**● no installation needed runs directly in browser**

**● accessible anywhere through internet in any device**

**● updates happen automatically for all user at once**

1. **What role does UI/UX design play in application development?**

**● UI/UX crucial for making application easy to use, UI focuseson how apps looks and UX focuses on how apps looks and work for user, this both thing makes the app user friendly and efficient so good experience keeps users coming back**

1. **What are the differences between native and hybrid mobile apps?**

|  |  |  |
| --- | --- | --- |
| **●** | **Native** | **Hybrid** |
| **Platform** | **build for specific platform like only for android** | **one app work on both platform like android and ios** |
| **Perfomance** | **Fast and smooth** | **Slightly slower than native** |
| **Devlopement** | **Separate code for each platform** | **Single codebase for all platforms** |

1. **What is the significance of DFDs in system analysis?**

**● helps to understand the flow of data clearly, it makes system analysis simple for both technical and non technical users and it used in planning and improving system structure**

1. **What are the pros and cons of desktop applications compared to web applications?**

|  |  |  |
| --- | --- | --- |
| **Pros** | **Desktop app.** | **Web app.** |
| **●** | **Runs directly on computer** | **Accessible from anywhere** |
| **●** | **Doesn’t need internet** | **No installation needed** |
| **●** | **Can be more secure** | **Easy to update and maintain** |

|  |  |  |
| --- | --- | --- |
| **Cons** | **Desktop app.** | **Web app.** |
| **●** | **Must install on each device** | **Needs internet to work** |
| **●** | **Needs to manually update on every device** | **Can be slower and depends on browser performance** |
| **●** | **Works only on specific OS** | **May have limited access to hardware** |

1. **How do flowcharts help in programming and system design?**

**● flowcharts are diagrams that show the steps of a process using arrows and symbols, it helps breaking down complex problems into simple steps, useful before writing actual code and main reason it helps explain the system to team or to client**