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SAD Lab Experiment 2
Case study 2

Aim - To learn case study for Software Development Life Cycle (SDLC).

Theory -

I. What is a secure SDLC and why is it important?

A Secure Software Development Life Cycle (SDLC) is a systematic and structured approach to building and delivering software applications with a primary focus on security. It involves integrating security practices and measures throughout the entire software development process, from the initial planning and design stages to coding, testing, deployment, and maintenance.

II.Importance of Secure SDLC:

1. Risk Mitigation: A Secure SDLC helps identify and address security vulnerabilities early in the development process, reducing the risk of security breaches and their associated consequences.

2. Cost-Efficiency: Fixing security issues at later stages of development or in the production environment can be significantly more expensive and time-consuming than addressing them during the development process.

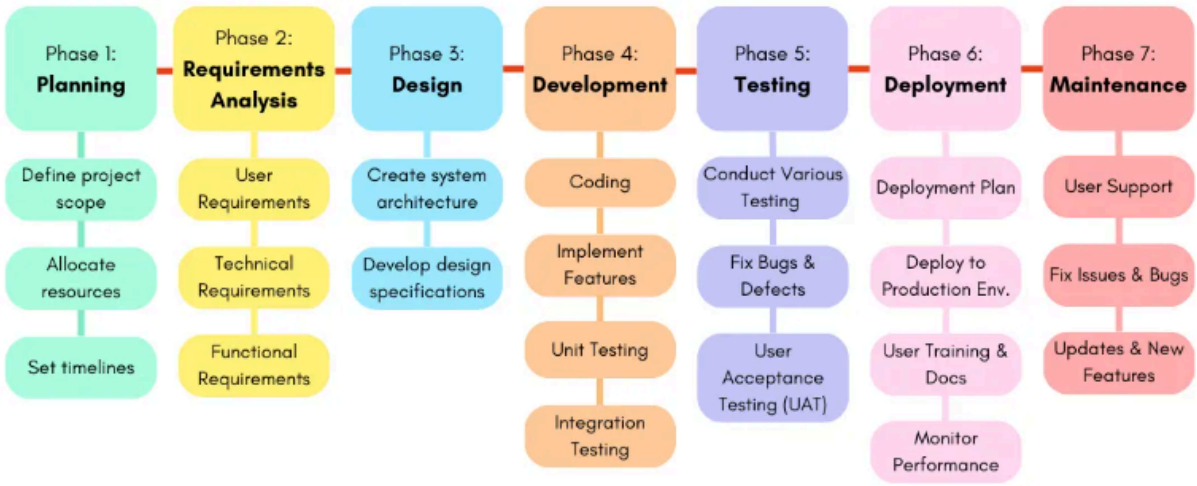
3. Compliance and Regulations: Many industries and jurisdictions have specific security and privacy regulations. Following a Secure SDLC can help organizations comply with these requirements.

4. Reputation and Trust: Building secure software enhances the reputation of the organization and fosters trust among customers and users.

5. Customer Confidence: Users are more likely to use and recommend software that they believe is secure and protects their sensitive data.

6. Long-term Sustainability: Secure software is less likely to be affected by security incidents, leading to a more sustainable product life cycle.

III. What are the steps/phases of SDLC?



The Software Development Life Cycle (SDLC) is a structured approach that guides the development of software applications from initial planning to deployment and maintenance. The SDLC consists of several phases, each with specific activities and deliverables. While different methodologies may have variations in the names or the number of phases, the core steps are typically as follows:

Stage-1: Planning and Requirement Analysis

Planning is a crucial step in everything, just as in software development. In this same stage, requirement analysis is also performed by the developers of the organization. This is obtained from customer inputs, and sales department/market surveys.

The information from this analysis forms the building blocks of a basic project. The quality of the project is a result of planning. Thus, in this stage, the basic project is designed with all the available information.

Stage-2: Defining Requirements

In this stage, all the requirements for the target software are specified. These requirements get approval from customers, market analysts, and stakeholders.
This is fulfilled by utilizing SRS (Software Requirement Specification). This is a sort of document that specifies all those things that need to be defined and created during the entire project cycle.

Stage-3: Designing Architecture

SRS is a reference for software designers to come up with the best architecture for the software. Hence, with the requirements defined in SRS, multiple designs for the product architecture are present in the Design Document Specification (DDS).

This DDS is assessed by market analysts and stakeholders. After evaluating all the possible factors, the most practical and logical design is chosen for development.

Stage-4: Developing Product

At this stage, the fundamental development of the product starts. For this, developers use a specific programming code as per the design in the DDS. Hence, it is important for the coders to follow the protocols set by the association.

Conventional programming tools like compilers, interpreters, debuggers, etc. are also put into use at this stage. Some popular languages like C/C++, Python, Java, etc. are put into use as per the software regulations.

Stage-5: Product Testing and Integration

After the development of the product, testing of the software is necessary to ensure its smooth execution. Although, minimal testing is conducted at every stage of SDLC. Therefore, at this stage, all the probable flaws are tracked, fixed, and retested. This ensures that the product confronts the quality requirements of SRS.

Documentation, Training, and Support: Software documentation is an essential part of the software development life cycle. A well-written document acts as a tool and means to the information repository necessary to know about software processes, functions, and maintenance. Documentation also provides information about how to use the product.

Stage-6: Deployment and Maintenance of Products

After detailed testing, the conclusive product is released in phases as per the organization's strategy. Then it is tested in a real industrial environment. It is important to ensure its smooth performance. If it performs well, the organization sends out the product as a whole. After retrieving beneficial feedback, the company releases it as it is or with auxiliary improvements to make it further helpful for the customers. However, this alone is not enough. Therefore, along with the deployment, the product's supervision.

Case Study: Software Development Life Cycle (SDLC) Implementation in Healthcare

Introduction:

This case study explores the implementation of the Software Development Life Cycle (SDLC) in a
healthcare organization aiming to enhance its Electronic Health Records (EHR) system. The healthcare
facility in question is a multi-specialty hospital with various departments and a significant patient load.
The organization identified the need to improve the existing EHR system to streamline processes,
increase efficiency, and provide better patient care.

Phase 1: Planning and Requirements Gathering

The hospital's management initiated the project by forming a cross-functional team comprising IT
specialists, healthcare professionals, administrators, and project managers. The team held discussions
with stakeholders, including doctors, nurses, administrators, and patients, to identify pain points and
gather requirements.
Key objectives identified:
Improve the EHR system's usability, ensuring easy navigation and user-friendly interfaces for medical
staff.
1. Enhance data security and privacy measures to comply with HIPAA regulations.
2. Increase interoperability to facilitate seamless data exchange between departments and external
healthcare providers.
3. Optimize system performance and reduce downtime for uninterrupted patient care.

Phase 2: System Design and Architecture

The design phase involved translating the requirements into a comprehensive design plan for the
enhanced EHR system. The team focused on the following aspects:
1. User Interface Design: UX designers collaborated with medical staff to create intuitive and
efficient interfaces that matched clinical workflows.
2. Data Security: Cybersecurity experts devised measures to protect sensitive patient data and ensure

compliance with data protection standards.
3. Interoperability: Technical architects identified standards and protocols for data exchange,
including HL7 and FHIR.
4. Performance Optimization: Infrastructure experts planned hardware upgrades and redundancy
measures to minimize system downtime.

Phase 3: Development and Implementation

The development phase commenced with coding and programming activities. The team followed Agile
methodologies to manage development iterations efficiently. They set up a continuous integration and
continuous deployment (CI/CD) pipeline to automate testing and deployment processes.
Key steps during this phase:
1. Developers created modular components, enabling parallel development and easier maintenance.
2. Regular code reviews and testing cycles were performed to catch and address defects early.
3. Data migration strategies were implemented to ensure smooth transition from the old system to
the enhanced EHR.

Phase 4: Testing and Quality Assurance

Comprehensive testing was conducted to validate the system's functionality, security, and performance.
Various testing types, including unit testing, integration testing, system testing, and user acceptance
testing (UAT), were performed.
1. Quality Assurance (QA) engineers conducted functional and non-functional testing to verify
compliance with requirements and standards.
2. Medical staff actively participated in UAT to provide feedback and identify any usability issues.
3. Rigorous security testing, including vulnerability assessments and penetration testing, was
performed to ensure data safety.

Phase 5: Deployment and Training

Once testing and quality assurance were successfully completed, the team prepared for deployment. The
enhanced EHR system was deployed in stages to minimize disruptions.
1. Comprehensive training programs were conducted for medical staff, administrators, and other
users to ensure a smooth transition to the new system.
2. Extensive documentation and user manuals were provided for reference.

Phase 6: Maintenance and Support
After the deployment, the project transitioned into the maintenance and support phase. The team
established a dedicated support team to handle any issues or requests that arose.
1. Regular system updates and patches were released to address bugs and security vulnerabilities.
2. User feedback was actively sought to identify potential areas of improvement.

Conclusion:
The successful implementation of the SDLC in enhancing the EHR system significantly improved the hospital's efficiency and patient care. The system's enhanced usability, data security, and interoperability led to streamlined workflows, reduced errors, and increased overall patient satisfaction. The healthcare facility continued to follow best practices in software development, prioritizing regular updates and continuous improvements to meet the evolving needs of the healthcare industry.