Software configuration

Definition of software configuration management

Software Configuration Management(SCM) is a process to systematically manage, organize, and control the changes in the documents, codes, and other entities during the Software Development Life Cycle. The primary goal is to increase productivity with minimal mistakes.

SDLC and their Baselines

- System engineering - System specifications
- Requirement's analysis - System requirements
- Design -Design specification
- Coding - Source code
- Testing- Test plans/
- Implementation/release - Operational system

Tasks in SCM process

- Configuration Identification
- Baselines
- Change Control
- Configuration Status Accounting
- Configuration Audits and Reviews

i. Configuration Identification:

Configuration identification is a method of determining the scope of the software system. With the help of this step, you can manage or control something even if you don't know what it is. It is a description that contains the CSCI type (Computer Software Configuration Item), a project identifier and version information.

Activities during this process:

- Identification of configuration Items like source code modules, test case, and requirements specification.
- Identification of each CSCI in the SCM repository, by using an object-oriented approach
- The process starts with basic objects which are grouped into aggregate objects. Details of what, why, when and by whom changes in the test are made
- Every object has its own features that identify its name that is explicit to all other objects
- List of resources required such as the document, the file, tools, etc.

Example:

Instead of naming a File login.php its should be named login_v1.2.php where v1.2 stands for the version number of the file

Instead of naming folder “Code” it should be named “Code_D” where D represents code should be backed up daily.

ii. Baseline:

A baseline is a formally accepted version of a software configuration item. It is designated and fixed at a specific time while conducting the SCM process. It can only be changed through formal change control procedures.

Activities during this process:

- Facilitate construction of various versions of an application
- Defining and determining mechanisms for managing various versions of these work products
- The functional baseline corresponds to the reviewed system requirements
- Widely used baselines include functional, developmental, and product baselines

In simple words, baseline means ready for release.

iii. Change Control:

Change control is a procedural method which ensures quality and consistency when changes are made in the configuration object. In this step, the change request is submitted to software configuration manager.

Activities during this process:

- Control ad-hoc change to build stable software development environment. Changes are committed to the repository
- The request will be checked based on the technical merit, possible side effects and overall impact on other configuration objects.
- It manages changes and making configuration items available during the software lifecycle

iv. Configuration Status Accounting:

Configuration status accounting tracks each release during the SCM process. This stage involves tracking what each version has and the changes that lead to this version.

Activities during this process:

- Keeps a record of all the changes made to the previous baseline to reach a new baseline
- Identify all items to define the software configuration
- Monitor status of change requests
- Complete listing of all changes since the last baseline
- Allows tracking of progress to next baseline

- Allows to check previous releases/versions to be extracted for testing

v. Configuration Audits and Reviews:

Software Configuration audits verify that all the software product satisfies the baseline needs. It ensures that what is built is what is delivered.

Activities during this process:

- Configuration auditing is conducted by auditors by checking that defined processes are being followed and ensuring that the SCM goals are satisfied.
- To verify compliance with configuration control standards. auditing and reporting the changes made
- SCM audits also ensure that traceability is maintained during the process.
- Ensures that changes made to a baseline comply with the configuration status reports
- Validation of completeness and consistency

SOFTWARE CONFIGURATION MANAGEMENT PLAN

The SCMP (Software Configuration management planning) process planning begins at the early coding phases of a project. The outcome of the planning phase is the SCM plan which might be stretched or revised during the project.

- The SCMP can follow a public standard like the IEEE 828 or organization specific standard
- It defines the types of documents to be management and a document naming. Example Test_v1
- SCMP defines the person who will be responsible for the entire SCM process and creation of baselines.
- Fix policies for version management & change control
- Define tools which can be used during the SCM process
- Configuration management database for recording configuration information.

SOFTWARE CONFIGURATION MANAGEMENT TOOLS

Any Change management software should have the following 3 Key features:

Concurrency Management:

When two or more tasks are happening at the same time, it is known as concurrent operation. Concurrency in context to SCM means that the same file being edited by multiple persons at the same time.

If concurrency is not managed correctly with SCM tools, then it may create many pressing issues.

Version Control:

SCM uses archiving method or saves every change made to file. With the help of archiving or save feature, it is possible to roll back to the previous version in case of issues.

Synchronization:

Users can checkout more than one files or an entire copy of the repository. The user then works on the needed file and checks in the changes back to the repository.They can synchronize their local copy to stay updated with the changes made by other team members.

Following are popular tools

1. Git: Git is a free and open source tool which helps version control. It is designed to handle all types of projects with speed and efficiency.

Download link: https://git-scm.com/

2. Team Foundation Server: Team Foundation is a group of tools and technologies that enable the team to collaborate and coordinate for building a product.

Download link: https://azure.microsoft.com/en-us/services/devops/server/

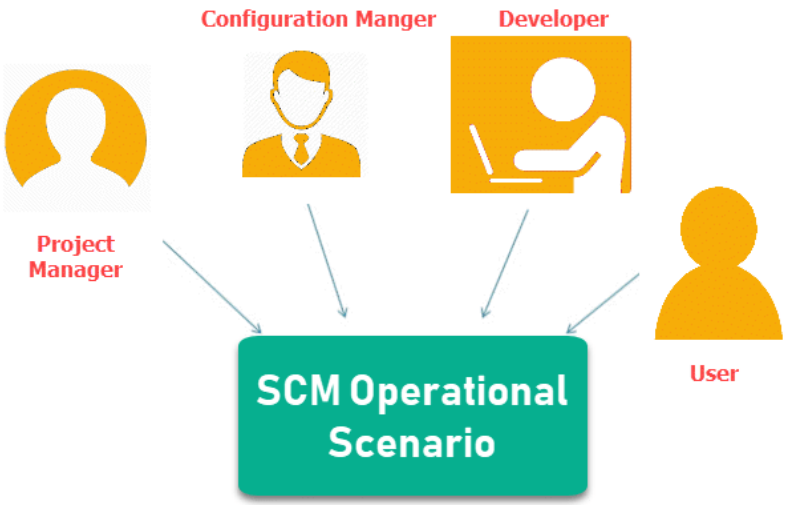
3. Ansible: It is an open source Software configuration management tool. Apart from configuration management it also offers application deployment & task automation.

Importance of configuration management

- There are multiple people working on software which is continually updating
- It may be a case where multiple version, branches, authors are involved in a software config project, and the team is geographically distributed and works concurrently
- Changes in user requirement, policy, budget, schedule need to be accommodated.
- Software should able to run on various machines and Operating Systems
- Helps to develop coordination among stakeholders
- SCM process is also beneficial to control the costs involved in making changes to a system

PARTICIPANT OF SCM PROCESS:

Following are the key participants in SCM



1. Configuration Manager

- Configuration Manager is the head who is Responsible for identifying configuration items.
- CM ensures team follows the SCM process
- He/She needs to approve or reject change requests

2. Developer

- The developer needs to change the code as per standard development activities or change requests. He is responsible for maintaining configuration of code.
- The developer should check the changes and resolves conflicts

3. Auditor

- The auditor is responsible for SCM audits and reviews.
- Need to ensure the consistency and completeness of release.

4. Project Manager:

- Ensure that the product is developed within a certain time frame
- Monitors the progress of development and recognizes issues in the SCM process
- Generate reports about the status of the software system
- Make sure that processes and policies are followed for creating, changing, and testing

5. User

The end user should understand the key SCM terms to ensure he has the latest version of the software

The Principles of Software Configuration Management/ software configuration components

Software configuration management (SCM), or software change management, as it is sometimes called, consists of four major activities:

- **Configuration Identification**—This is the process of identifying all of the components of a project and ensuring that these components can be found quickly throughout the project life cycle. As previously mentioned, a typical intranet project is like a software development project and is comprised of much more than source code or HTML. Configuration identification breaks a project into smaller, more manageable subprojects, such as design documents, special graphic files, and so forth. A good automated SCM package supports mapping of a project tree, indicating the logical configuration hierarchy, as well as the directory structure, or physical configuration hierarchy. The version control and SCM product must be able to cross all departmental boundaries to include a wide variety of project participants.

- **Configuration Change Control**—This important activity coordinates access to project components among team members so that data do not "fall through the cracks," become lost, or that unauthorized changes are made. To provide protection from lost changes, most SCM systems offer a check-in/check-out process that allows write-access to a single user for a project file. Current and previous versions of a file are identified and tracked, with the ability for a user to request a copy of a previous version of a file at any time.

- **Configuration Auditing**—Configuration auditing is a process that confirms that a software or intranet project is on track and that the developers are building what is actually required. By developing a series of checklists that specify what components are in a given baseline, a company can audit the degree to which a project or intranet is complete.

- **Configuration Status Accounting**—The goal of configuration status accounting is to record why, when, and by whom a particular change is made to the source code of a project. In the past, developers would manually keep notebooks and insert comments into the code, but good SCM systems keep automated histories of all changes and generate reports that describe the changes over a period of time