Comparative Analysis of various Software Configuration Management Tools

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Abstract: Software Configuration Management has been categorized as the rule of controlling the progress of multidimensional programming frameworks. As a basic job for expert programming progress it also needs to accommodate programming tasks completed utilizing procedure. This paper analyzes the instruments for programming arrangement administration which help for better process in IT association.
Software Configuration Management (SCM)

1. Introduction

The current meaning of Software Configuration Management (SCM) is the control of the progress of multipart frameworks. It is the control that allows us to continue advancing programming item under control, and fulfilling quality and delay requirements. A standard definition taken from IEEE standard 1042 highlights the accompanying operational parts of SCM as.

   "Software configuration management is a discipline for managing the evolution of computer programmer products, both during the initial stages of development and during all stages of maintenance."

   ➢ **Documentation**: A Documented plan helps in the construction of the item, analyze parts and sort them making them available in some structure.

   ➢ **Control**: controlling the arrival of an item and changes to it all through the lifecycle by having controls set up that guarantee predictable programming by means of the production of a gauge item.

   ➢ **Status Accounting**: recording and reporting the status of segments and change demands, and social event crucial insights about parts in the item.

   ➢ **Audit and review**: accepting the fulfillment of an item and keeping up consistency among the parts by ensuring that the item is an all-aroundconsideredgathering of parts.

2. The Definition of an SCM System

For a SCM framework [1, 2], there is no any globally known definition. Case in point, if a framework has form control, is it a SCM framework? A SCM framework is one that gives all practicality in view of the definition as expressed previously. Yet, all in all, any framework that gives some type of adaptation control, design recognizable proof, framework organizing, framework displaying, and has the expectation of giving SCM is considered by to be a SCM framework. It ought to be noticed that current SCM frameworks give their own blend of usefulness as opposed to a standard set including:

➢ Large Teams.
➢ Time taken to meet customers' requirements.
➢ Changing Requirements.
➢ Widely dispersed teams.
➢ High complexity.
➢ Multiple versions for different markets and customers.

3. Literature Review:

The writing proposes that changereviewdevices that could be effective in view of policy. Facilities which are the results of achievement elements and boundaries to a policy. Leading organizations follows configuration management. There is a requirement for control change to keep up the function of the expansive information sets that depict complex building resources conveyance and operation in settings [3].

This paper proposes the development and manufacturing policy for production control application which helps in manufacturing the software product to run effectively. Advanced planning and scheduling are helpful in making the product effective. A lot of correction can be done in the field of manufacturing. Different vendors using different technologies [4].

This article suggests that in the competitive world it is necessary to provide the product in a very cheaper cost. For that proper planning and proper configuration management should be done so as to fulfill the customer requirements. In programming improvement, the progress procedure is described by continuous changes. Generally, a group of individuals delivers, changes and trades regular and individual programming parts, cooperating towards a normal objective. Frequently, the objective is not a solitary static item, but rather an element accumulation of segments outlined to work with one another. [5].

In the time of increasing market disintegration the skills to offer a customized product to the user at the competitive level or at a low cost is a crucial success factor for companies. Therefor considering the benefits and expenses of product variants during configuration process is a significant challenge. There is no systematic approach that is similar to both standard variant and customer requirement. This paper introduces a policy that allows companies of a product similarity between new product variant and existing variant [6].

This paper explore the setup administration process abilities concluded on the premise of semi-organized meetings with setup administration experts and investigation of two profoundly huge studies in the improvement of setup administration as a researchable subject Before implementation of the resources proper resource identification and proper resources utilization should be done to make product feasible. There are no. of factors related to SCM (Software Configuration Management) like change management variant management should be done [7].

Changes are technological, economical and landscape manufacturers are faces challenges such as short product life, system complexity, product complexity, reduced product life time Not all gatherings may bring about a complete and reliable item, and the gathering is frequently made out of countless, with a few persons at diverse locales keeping up and evolving them; the whole progress handle frequently turns into a ceaseless history of changes, corrections and enhancements. To keep all multi-rendition, multi-individuals exercises under control, it is crucial to present the ideas altogether called "programming setup administration" (SCM) [8].

The main study explored the discriminating achievement components for the effective CM improvement while the other study took a gander at the recognizable proof of obstructions to powerful CM sending. The writing recommends that dominant part of research studies have focused on the procedure ability itself, not the achievement or disappointment of CM. A rundown of ten procedure capacities are settled which will give the fundamental establishment to devise and measure a setup administration development model. Configuration Management involves change management, variant management, Branch management and all the other features that should be follow while developing a product [9].

Characteristically, the utilization of SCM [10] infers an extra overhead in time, assets, and different parts of the programming lifecycle. SCM is essential for any configuration assignment, including programming improvement.

4. The Benefits of a Software Configuration Management System

A sponsor amongst the most basic inspirations to have such a SCM system is the need information in the source code that is being changed in two particular countries. There is a need for such a Software Configuration Management System as a consequence of the innovation of programming at took spots. In such cases there is anabsence of information in the source code that has been changed or administered that they oblige a dominant SCM game plan as an aftereffect of [11]:

➢ Productivity enhancements Efficiency upgrade, particularly for designers who have their fundamental concentrate on the innovative piece of their work instead of tasks.

➢ More open door for development with capacities impractical some time recently, similar to the capacity to have variation discharges for multi-stage items and engender changes crosswise over them and to have the capacity nearcraftcovers to particular client.

➢ Brightness into the condition of the product improvement and upkeep exercises and additionally to all the progressions furthermore, information things; history of all things, for example, who rolled out an improvement, when, how, why a changed.

➢ Healthier estimating of discharge dates on the grounds that the change process duration gets to be quantifiable and thus, more unsurprising.

➢ Change sway investigation to help decide the amount of exertion is included in a change and subsequently, how much time it will take.

➢ Lessgerms in documented discharges; numerous bugs found in discharges could have been kept away from if SCM were set up.

## 5. Software Configuration Management Activities

According to IEEE (IEEE Std. 828-1990) [12, 13] traditional definition of SCM, The following activities are included: Configuration Items, Change Management, Release Management, and Branch Management.Positive SCM operation also require careful planning (Abram and Moore 2001

5.1 Configuration Items: An aggregation of hardware or software or both that is designated for configuration management and treated as a single entity in the configuration management process. Configuration items are not only programmer code segments but all type of document e.g.all type of code files.

➢ Drivers for test.
➢ Analysis or design document.
➢ User or developer manuals
➢ System configuration.

5.2 Change Request: It is the process of handling of change request it is assessed against project goals. The complexity is varying by project to project. First the change is assessed whether it is accepted or rejected if it is accepted it assigned to developer and implemented and this implementation is audited.

Promotion and Release are two types of controlling change:
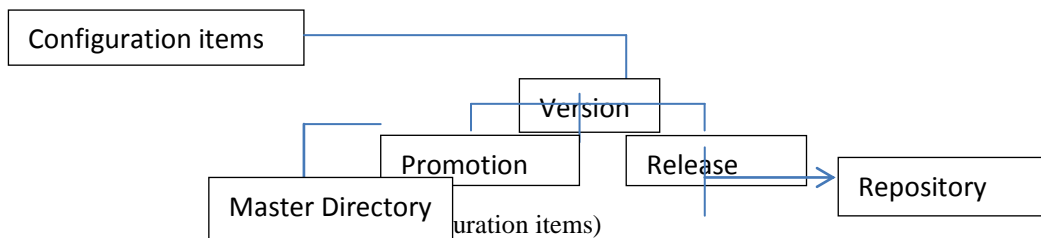
5.3 Base Line in SCM:A detail or item that has been formally audited and consented to by dependable administration, that from there on serves as the premise for further improvement, and can be changed just through formal change control strategies[14]."
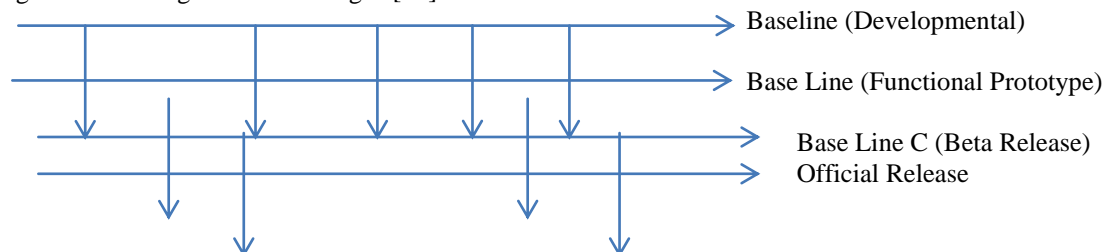

Figure 1.2(Baseline)

6. Software Configuration Management Tools

There are a number of SCM tools [15] available while their feature very greatly. According to Leon (2000) every tool has its own strengths and weakness. For example some are good at change management whereas others have excellent build management and version capabilities.

1. VSS (Virtual Source Safe)
2. SVN (Subversion)
3. CVS (Concurrent Version Control)
4. GIT
5. Perforce
6. Razor

6.1 SVN:

SVN (Subversion) [16] is the most prominent open source Configuration Management device utilized for adaptation and controlling. Being open source, it is openly accessible over the internet. It support nuclearrequire that means that if aprocess on the source is intruppeted in the middle, it only take effect after entire commit has succeed.

Advantage of SVN

➢ Simplicity of set up and organization.
➢ Quick and adaptable redesign submits.
➢ Gives high deceivability to changes without breaking a sweat of returning the progressions of a document.
➢ SVN has programmed blending and clash resolve which makes locking superfluous.
➢ Full modification history is kept up by for the documents that are renamed, replicated or moved.
➢ Moving From one branch to another branch is simple.

Disadvantage of SVN

➢ Old projects and existing build system need conversion
➢ Not as wide as CVS

6.2 VSS :(Virtual Source Safe) [17] is a concentrated form control framework from Microsoft? It was created by North Carolina Company called One Tree Software.

➢ Superior with nearby and remote access.
➢ All the store information is put away in Microsoft SQL Server to guarantee the respectability of the information.
➢ Since it is constructed in C++ and JAVA, it has a negligible framework requirement. We can introduce it in 32 bit and 64 bit Operating Systems.

6.3 GIT:

Git [18] is a conveyed adaptation control apparatus that was developed by Linus Torvalds to backing the improvement of Linux. In April 2005 Git was utilized for the first time and Linus made the first confer with code for Linux.

➢ GIT is a powerful & distributed tool.
➢ Distributed revision control takes a peer-to-peer approach to version control, as opposed to the client-server approach of centralized systems.
➢ It has many useful functions and it is easy to create and merge Branches.
➢ GIT is a popular version control tool where everyone has his own repository and you can pull and push changes between the developers.

6.4 CVS (Concurrent Version Control):

CVS, a free, open source tool, is maybe the most popular Open Source SCM tool. Even though it has some serious faults, CVS is used for lots of open source projects, including Apache WWW server, FreeBSD (FreeBSD is a free Unix-like operating system), Nets, Opens, GNOME, and Exams. CVS is one of the first Open Source version control projects, which is used by many people, but it has its limitations.

Advantage of CVS
- ➤ Heritage systems may use CVS
- ➤ Many clients have built-in-support for CVS

Disadvantage of CVS
- ➤ It is unrealistic to rename or move a record or index in the storehouse.
- ➤ Moving records without losing information is impossible without the sys-administrator
- ➤ File metadata is not formed
- ➤ Need for labels, and so forth due to cost of expanding extensive trees
- ➤ Limited support for twofold records
- ➤ P-server sends clear content

6.5 Perforce:

Perforce is a prevalent tool in the scholarly group, maybe in light of the fact that the organization gives the device to allowed to open source activities Perforce is known for its frank building design and special diffusionprove that advances outwards rather than inwards towards the trees' trunk. Perforce is a SCM framework with notice on elite, utilizing RCS documents in addition to a database. Backings forming of most protests, change control, shared access, nuclear submits, expanding/blending, and calculating for programming creation groups.

Advantages of Perforce:
- ➤ Classification feature
- ➤ Built-in defect tracking
- ➤ Reporting system that can be accessed by popular reporting tools

Disadvantages:
- ➤ Very expensive tool
- ➤ No directory versioning

7. Comparative Analysis of SCM TOOLS

After re-claiming the neededdesires the search for the most related SCM starts.This is overseen via looking for all open source and business SCM frameworks. To look for the most suitable SCM tool[19,20,21], some important parameters are taken into account such as Control System, Programming Language, License, Web Interface etc.

Table.1 Comparative Analysis of three SCM tools on different parameters

Parameters	Microsoft Virtual Source Safe (VSS)	Sub Version (SVN)	GIT
Control System	Centralized version controlled by Microsoft	Centralized Version Control	Decentralized Version Control
Programming Language	C	C	C, Shell Script
Licence	Commercial Software	Apache	General Public License
Web Interface	VSS Remoting	Apache2 Module Included	GIT HUB,GIT WEB
Platform Supported	Windows	Unix ,Windows	Posix , Windows
Cost	Paid	Free	Free
Repository Model	Shared Folder	Client Server Model	Distributed Revision Control
Storage Method	Snapshot	Change Set Snapshot	Snapshot
Scope of Change	File	Tree	Tree
Supported Format	Null	Subversion	GIT,CVS,Subversion
Lock\Unlock	Null	Unlock and Lock File	No File Locking

8. Challenges:

Software Configuration Management Tools is a critical factor in the process of building and maintaining quality software. All SCM tools are able to do the simple things, including managing file versions and branching/merging streams of development. However, there are several challenges in software development that are truly difficult. In fact, some things are so difficult that many organizations have become sensitive to the fact that SCM cannot easily solve them. Some of the challenges like **flexibility, Visibility, Multiple environment**overcome.

Challenges of scm tools
- Flexibility
- Visibility
- Multiple environment
- Change validation
- Outsourcing

FLEXIBILITY: Flexibility is used as an element of various types of systems. It refers to designs that can adapt when external changes occur like Program flexibility Production flexibility Market flexibility

VISIBILITY: Visibility change in event of program, function name, latest version of tool cannot update in data base.

MULTIPLE ENVIRONMENT: IT(information Technology) conditions normally change various groups and may be overseen by distinctive gatherings.

CHANGE VALIDATION: Change validation looks to security that traditional routines and methodology are utilized for capable and brief treatment of all adjustments.

OUTSOURCING: Utilizing many merchants as a part of typical areas crosswise over time zones makes it to a great degree hard to manage change like Adminchange, outdated framework

9. Conclusion

This paper has introduced where we were, the place we are, and where we plan to go all together to take care of our CM needs and issues. SCM include both the technical and managerial task. In the current scenario very large amount of elements are involved during software development life cycle, without SCM software development will become improbable task. SCM is a way to manage different software artifacts. Now a day's requirements of users are changing very rapidly, to meet this various processes are being automated. SCM tools are one of the best solutions of this automation. The selection of SCM tools depend on particular organization's requirements. Definitely we need not to use all the features of a SCM tool; most of the SCM tools provide some degree of customization. Initially we should identify and define our requirements, which mean understanding development process and how SCM can support it.

10. Future Work

The future is characterized by five principle issues: Flexibility, Visibility, multiple environment, Change validation and Outsourcing. Administration needs help with choice making about CM frameworks, for example, whether to purchase or manufacture choice a CM framework. The commit operation of CVS is not automatic if the network connection breaks in the middle of commit operation this may damage your data. Subversion seems to implement all features that are missing in CVS. Thisstudy described a practical analysis of three famous SCM tools. This analysis can be further enhanced by taking few latest tools for analysis. An integrated framework can be designed to support existing tools using adaptable Software Configuration Management.

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