A study on Hierarchical Distribution of CVS Repository for Open Source Software Development

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Background and Purpose

In recent years, cooperative development of software in wide area distributed environment has been performed by the evolution of the Internet and the improvement of computer resources. One of the developments is open source software development. In this development, it has two or more development sites or sub-projects in many cases when the project scale becomes large. Sub-projects are distantly separated from each other in the Internet, or a policy of management for a project differs greatly. Therefore, the repository that manages their products needs to support distributed configuration.

There exist Software Configuration Management Systems (SCMs) that provide a distributed configuration of repositories. However, their distributed models do not support flexible configuration according to projects and do not apply the policy of operation for every repository. Because of this, it is difficult to support open source software development specifically.

In this paper, a hierarchical distribution model of repository with the feature that is applicable to the development process of open source software is realized. With this configuration, an application of the policy of operation is enabled for a repository, maintaining a relation between repositories. The method of this paper can apply the policy of operation which is independent for every sub-project. The configuration of SCMs that is applicable to the development process of open source software is realized.

Configuration of Repository and Model of Hierarchical Distribution of CVS Repository

The evolution of open source software development projects and their great success have been obtained by the users in wide area distribution because open source software receives the contribution of an idea, a source code, a bug fix, a test report, etc. The distributed model of Repository needs to enable to reflect the contribution for a sub-project to the repository for a main project. Therefore, it is necessary to maintain the relation for reflecting or taking in the product of development between repositories. This relation can also maintain consistency because it allows inconsistency of the version between repositories, and the product of development is reflected finally in order to raise the parallelism of development.

In this paper, we will propose the model of hierarchical distribution of CVS repository with the feature as follows.

- The distribution of repository is hierarchy (Parent-Child relationship)
- The distributed configuration of repository can be flexibly constituted for a project structure
- A different policy of operation for every repository can be applicable
- The relation between repositories is maintainable

This model makes an independent policy of operation applicable to every repository, maintaining the relation between repositories based on the version model of CVS which, is widely used by open source software development. Furthermore, the Child repository enables reflection of its own product to the Parent repository.

This model consists of the following three elements:

- The work model (parallel development, delegation of development)
- The operation of revision numbers
- The relation between repositories (synchronize of version, term of feedback, notification of conflict, delegation of version)

First, the work models are the mechanism that prevents inconsistency of the contents of the version between Parent and Child repository. The operation of revision numbers is a mechanism that prevents inconsistency of a revision number. Moreover, the relation between repositories is the mechanism that associates between repositories. By combining these primitives, a few distributed configurations is realizable.

For example, parallel development and delegation of development is realizable as a development style between projects. In the parallel development, a different development process for every sub-project is supportable by enabling a application of a policy of an operation plan for every Child repository. Moreover, in the delegation of development, the

version in Parent repository can be locked and it can delegate to a team with a different role for every stage of development by permitting work freely to the version in Child repository.

The case where it has two or more sub-projects depending on a development project, two or more related projects, a sub-project has a sub-project further. Then, with this configuration, complicated distributed configuration can also be taken by combining two or more them on the basis of one to one correspondence between Parent and Child repository.

Conclusion and Future Works

In this paper, we developed to construction of the hierarchical distribution of CVS repository that offers suitable support for the project of open source software development. Thereby, the repository is constituted according to the demand of a project and can apply the policy of operation that is different in each other. Furthermore, it becomes possible to make a product reflect between a main-project and a sub-project, or to delegate of development.

As future works, at first, we will have development of a prototype system based on the model. Furthermore, when the configuration of repository becomes complicated, it will be necessary to consider whether the version model of CVS can be used by the such case.