SLIATE

SRI LANKA INSTITUTE OF ADVANCED TECHNOLOGICAL EDUCATION

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Higher National Diploma in Information Technology

Second Year, Second Semester Examination – 2016

HNDIT 2412 - Software Configuration Management

Instructions for Candidates:	No. of questions : 05
Answer five (04) questions only	No. of pages : 03
All questions carry equal marks	Time : 02 hours

Question 01

a) Why do you need Software Configuration Management (SCM?

Eliminate inconsistency problem when the objects are replicated

Reduce the problems associated with concurrent access

Provide a stable development environment.

(2 marks)

b) What is a Configuration item (CI)? Give two examples for the following configuration items.

CI is a single entity in the configuration management process **(1 mark)**

i. Coding

Source code, object code, data files..etc (1 marks)

ii. Documentation

SRC, Architectural Design Doc, Validation Plan….etc (1 marks)

c) Describe the main activities in Configuration Management?

Configuration Item Identification

The purpose of the identification activity is to determine the metadata for a configuration item

Using meta data CI can be identified

(2 marks)

Configuration Control

- **How to identify the need for a change (layout of change request form)**
- **Analysis and evaluation of a change request**

- **Approval or disapproval of a request**
- **Verification, implementation and release of a change**

(2 marks)

Configuration Status Accounting

- **Answers the following questions:**
  - **What elements are to be tracked and reported for baselines and changes?**
  - **What types of status accounting reports are to be generated? What is their frequency?**
  - **How is information to be collected, stored and reported?**
  - **How is access to the configuration management status data controlled?**

(2 marks)

Configuration Audit and Review

- **Identifies audits and reviews for the project**
  - **An audit determines for each configuration item if it has the required physical and functional characteristics**
  - **A review is a management tool for establishing a baseline.**

(2 marks)

d) i. What is the Configuration Management Plan

The outcome of the software configuration management planning is the Configuration Management Plan. It define following things.

- **Defines the *types of documents* to be managed and a document naming scheme**
- **Defines *who takes responsibility* for the configuration management procedures and creation of baselines**
- **Defines *policies for change* control and version management**
- **Describes the *tools* which should be used to assist the configuration management process and any limitations on their use**
- **Defines the *configuration management database* used to record configuration information** **(2 marks)**

ii. List main component of Configuration Management Plan

Introduction

- **Describes the Plan's purpose, scope of application, key terms, and references**

2. SCM management (WHO?)

- **Identifies the responsibilities and authorities for managing and accomplishing the planned SCM activities**

3. SCM activities (WHAT?)

- **Identifies all activities to be performed in applying to the project**

SCM schedule (WHEN?)

- **Establishes required coordination of SCM activities with other activities in the project**

5. SCM resources (HOW?)

- **Identifies tools and physical and human resources required for the execution of the Plan**

6. SCM plan maintenance

- **Identifies how the Plan will be kept current while in effect** **(5 marks)**

Question 02

a) Define the term "Version Control System." List down three version control systems.

Version Control is tracking and controlling changes to documents, computer programs, large web sites, and other collections of information

(2 marks)

What are the main characteristics of a Version Control System?

Reversibility
Concurrency
Annotation

(6 marks)

b) List down the five features of good VCS.

- **VCS stores and retrieves multiple revisions of program and other text**
- **VCS maintains a complete history of changes**
- **VCS can merge multiple lines of development**
- **VCS flags coding conflicts**
- **VCS provides high-level retrieval functions**

(5 marks)

c) Describe the following categories of version control software and Give examples for each version control software.

a) Local Only

All developers of a project needed to be on the same machine as the single central project repository

o Free/open-source
SCCS, RCS
o Proprietary
PVCS (2 marks)

b) Client–Server

Here server is the central repository for all changes allow developers to work with centralized repository over a network from other machines

o Free/open-source
CVS, CVSNT, Subversion
o Proprietary
Software Change Manager, ClearCase, CMVC, Visual SourceSafe, Perforce, StarTeam, MKS Integrity, AccuRev SCM, SourceAnywhere, SourceGear Vault, Team Foundation Server, Rational Team Concert. (2 marks)

c) Distributed

- **A project may have several different repositories**
- **Each developer has his own repository and these systems support a sort of super-merge between repositories that tries to merge their change histories**

o Free/open-source
GNU arch, Darcs, DCVS, SVK, Monotone, Codeville, Git, Mercurial, Bazaar, Fossil, Veracity.
o Proprietary
□ TeamWare, Code Co-op, BitKeeper, Plastic SCM.

(2 marks)

Question 03

a) the central storage facility for all CIs. All CIs are stored in one of three libraries: the development library, the master library or the archive library. Every CI has a subdirectory of the CVS repository that contains all versions of all les related to the CI.

(02 marks)

b)Development library

For all CIs with the exception of source code documents, it is only the team leader of the team responsible for a CI that is allowed to checkout (from the repository) a document belonging that CI. It is then the responsibility of that team leader to

maintain change control on any checked out documents. For source code we make use of the change control system CVS provides.

Master library

Once a CI is externally approved the CM can put it in the master library. If authors want to make changes to a document inside the master library, then that author has to take up contact with the QM. The QM will call up a review meeting where all the changes are approved or rejected. More information regarding the change procedure can be found in the SVVP When changes to a CI are approved the CM will put a copy of the existing version of the CI in the master library to the development library, and subsequently he will put the new version of the CI in the master library. As the CM is the only one allowed to remove/create new documents in the master library, there is no need for change control.

Archive library

CIs in this library cannot be modi ed under any condition. New versions may only be added after they have been externally reviewed and approved as described in the SVVP Since documents in this library cannot be modi ed, there is no need for change control.

(06 marks)

c)

- **Configuration Manager**
  - **Responsible for identifying configuration items**
  - **Also often responsible for defining the procedures for creating promotions and releases**
- **Change Control Board Member**
  - **Responsible for approving or rejecting change requests**
- **Developer**
  - **Creates promotions triggered by change requests or the normal activities of development. The developer checks in changes and resolves conflicts**
- **Auditor**
  - **Responsible for the selection and evaluation of promotions for release and for ensuring the consistency and completeness of this release.**

(08 marks)

d)

a. **VCS stores and retrieves multiple revisions of program and other text**
b. **VCS maintains a complete history of changes**
c. **VCS can merge multiple lines of development**
d. **VCS flags coding conflicts**
e. **VCS provides high-level retrieval functions** **(04 marks)**

Question 04

a) Differentiate Revision and Branching.
Revision: In the software configuration world, this term is often used for a version of an resource that is designed to replace an earlier version, such as a new version of a source file or a revised requirement. In the hardware world, the term revision often has a more precise meaning with implications about the scale of a change. To avoid confusion, the OSLC Configuration Management specification should avoid the term.

Branch: a branch identifies a set of version resources (revisions) that form a parallel variant of a concept resource - for example, a set of versions of a product for a particular geography or market. The term is also used to identify the point in the version history at which that new branch was created, and the parent version from which the new branch was derived. Finally, as a verb, branch is also used to describe the action of creating the initial parallel version. (2 marks)

b) Briefly explain the following terminology.

i. Commit

To *commit* (*check in*, *ci* or, more rarely, *install*, *submit* or *record*) is to write or merge the changes made in the working copy back to the repository. The terms 'commit' and 'checkin' can also be used as nouns to describe the new revision that is created as a result of committing. (1 marks)

ii. Locking

Taking control of a file so nobody else can edit it until you unlock it. Some version control systems use this to avoid conflicts. (1 marks)

iii. Trunk

The main branch of a revision history (1 marks)

iv. Conflict

an incompatibility between two or more changes to the same code (1 marks)

v. Tagging

A *tag* is a string that represents a single revision of a file. Multiple tags can point to the same revision of a file. Sometimes, *label* is used as a synonym for tag.

(1 marks)

c) What are the three classes of tools for SCM and briefly explain the capacity size and features for each classes.

Tool	Company Size	Features
Individual support tool **(1 mark)**	smaller companies or development groups **(1 mark)**	• small number ofreleases • no variants • complicated CM activities are few **(1 mark)**
Project-related support tool **(1 mark)**	medium to larger companies **(1 mark)**	• have a need for handling variants • parallel development **(1 mark)**
Full, company-wide process-support tool **(1 mark)**	larger companies **(1 mark)**	• have a need for handling variants • parallel development • suitable for companies that develop composite systems **(1 mark)**

d) Briefly explain agile development and Iterative development in SCM

Agile Development

* **Individuals and interactions over processes and tools**
* **Working software over comprehensive documentation**
* **Customer collaboration over contract negotiation**
* **Responding to change over following a plan** (2 marks)

Iterative development

When some or all of the activities are repeated in short cycles it is called iterative development

Examples for iterative models are RAD , Spiral (2 marks)

Question 05

a) Explain Version Merging using example

- **It is a fundamental operation that reconciles multiple changes made to a revision-controlled collection of files.**
- **It is necessary when a file is modified by two people on two different computers at the same time.**
- **When two branches are merged, the result is a single collection of files that contains both sets of changes.**

(4 marks)

b)What is the difference between SVN commit and SVN update?

Update is used to update the local workspace with the changes made by the team to the repository, while commit is the process to implement changes from local to repository, in simple words, upload a file into repository.

(4 marks)

b) Student1 **adds** a file (subject.txt) to the **Repository**. She **checks it out to her local copy to the Project1 directory**, makes a change (puts three subject on the list), and checks it back in with a checkin message ("Added required item."). After 1h Student2 **updates** his local working set and remove the last subject from the file

i. Write the command to create a Reporsitory

```
svnadmin create Reporsitory
```

(2 marks)

ii. Write the command, to create two users Student1 and Student2.

```
htpasswd -cm /etc/svn-users Student1
htpasswd -cm /etc/svn-users Student2
```

(2 marks)

iii. Write the command, Student1 used to import "subject.txt" file from "tmpDir" folder to the "Repositiry"

Svn import tmpDir\ file:///C:/ ProjectRepo/ (2 marks)

iv. Write the command to download "subject.txt" to a new folder called "Project1" from the Repositiry.

Svn checkout file:///C:/ProjectRepo

(2 marks)

v. Write the command, Student1 used to upload the "subject.txt" to the Reporsitory.

C:/Project> Svn commit

(3 marks)

(3 Write the command View the files inside the Reporsitory

Svn list file:///C:/ProjectRepo

(2 marks)

Question 06

I. Explain the following commands

a) **Svn—version**
To check whether subversion is installed (1 marks)

b) **Svnlook tree**
To view the tree structure of the repository (1 marks)

c) **Svn diff**
This display the differences between two revisions or paths (1 marks)

d) **Svn status**
Print the status of working copy files and directories (1 marks)

e) **Svn log**
Display log messages from the repository (1 marks)

II. Mention what is the function of Revert in subversion?

"Revert" function will remove your local changes and reload the latest version from the repository. (3 marks)

III. Suppose User1 and User2 are the two developers working on a project. User1 and User2 checkout the "account.html" from the repository. At this point, their working copies are completely synchronized with the repository. User1 completes his work very efficiently and commits his changes to the repository. Now User2's working copy is out of date.

a) Write the command, User2 used to get the User1's latest changes from the repository.
Svn update (03 marks)

b) After performing command used in part A, User2 also did the changes to his working copy. Write the command, User2 used to review his changes before the 'commit' operation.
Svn status or Svn diff (03 marks)

c) User1 found that someone has already added the code for the "account.html" file. So he is curious about who did that. Write the command, User1 used to check the log message to see more details.
Svn log (03 marks)

d) Suppose User1 has made changes again to his working copy. Write the command, User1 used to throw away these changes before applying the commit operation.
Svn revert (03 marks)