Software Project Management

Chapter12: Software Configuration Management

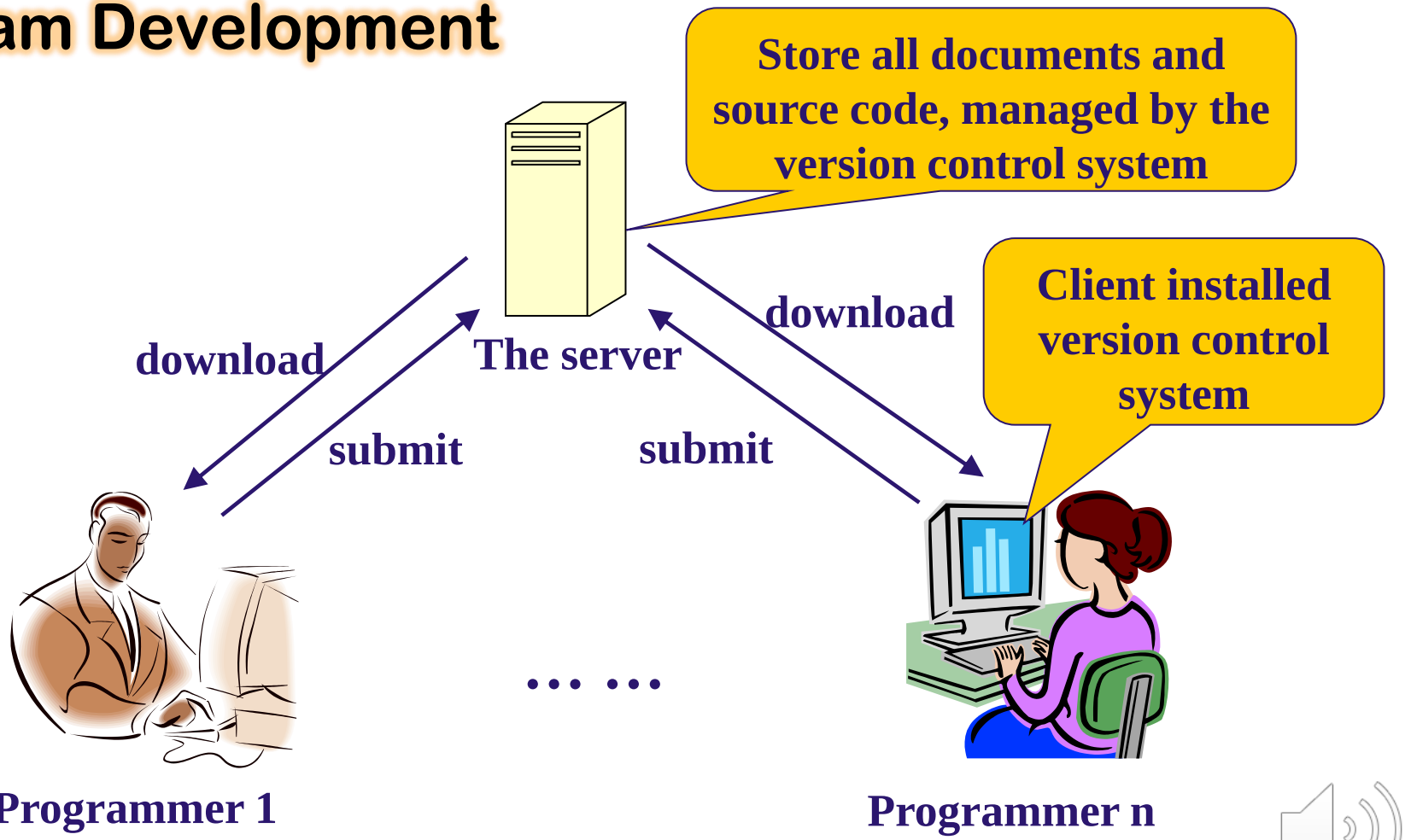
北京工业大学

Software Configuration Management

1. Role of Software Configuration Management
2. Terminology of Software Configuration Management
3. Software Configuration Management Process
4. Software Configuration Management Tools

12.1 Role of Software Configuration management

General Model of Team Development



12.1 Role of Software Configuration management

Changing the program by different programmers will produce conflict

Programmer A

modify

common-function.java

Add function checkStringlength()

submit

Program integrity is damaged

The server

Programmer B

modify

common-function.java

submit

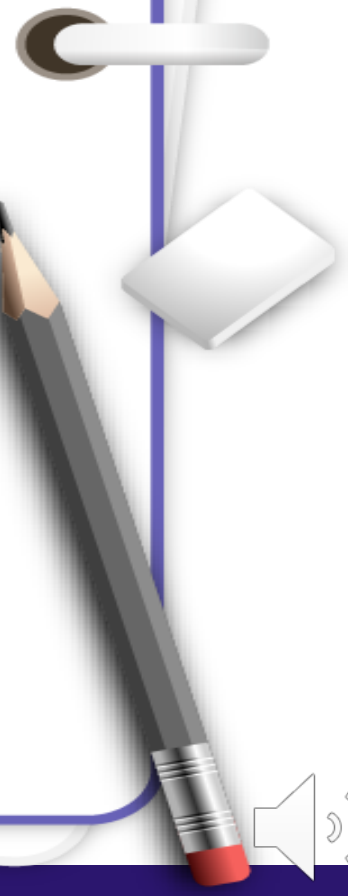
Add function checkDate()

12.1 Role of Software Configuration management

Why Software Configuration Management ?

Software Project may encounter the following problems:

- Historical versions of a file can not be found
- Developers use the wrong version of the program
- Developers have not been authorized to modify the code or document
- Due to collaborative development or remote development, version change chaos led to the failure of the entire project ……



12.1 Role of Software Configuration management

What is Software Configuration Management?

A set of management disciplines (methods and rules) within a software engineering process to manage a variety of intermediate software products during software development and maintenance process.

A major problem faced by the software project is continuous change.

Change may lead to confusion, and there is a need for coordination.

12.1 Role of Software Configuration management

Objectives of Software Configuration Management

- Identify change
- Control change
- Ensure that the change is implemented correctly
- Report changes to organizations and individuals affected by the changes

12.1 Role of Software Configuration management

Objectives of Software Configuration Management

- Recording the **evolution** of software product
- Ensure that software developers can **get accurate product configuration** at all stages of the software life cycle.
- Ensure the **integrity, consistency and traceability** of software products

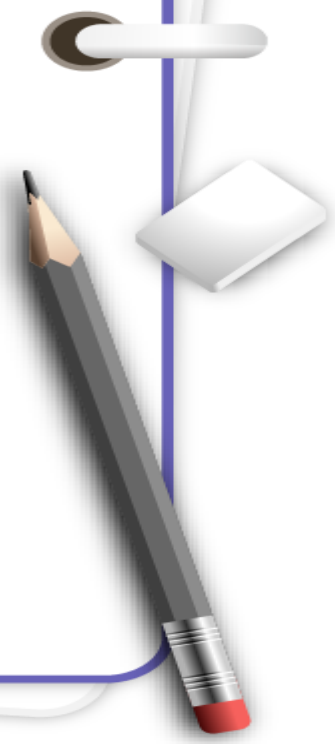
12.1 Role of Software Configuration management

The Main functions of Software Configuration Management

- **Version Control:** Using the corresponding procedures and tools to manage various documents produced during the software development process. It is the key function of software configuration management
- **Change Management:** including change request, change assessment, change approval

12.2 Terminology

- Software Configuration Item, SCI
- Baseline
- Version
- Revision
- Release



12.2 Terminology

Software Configuration Item

The object of software configuration management,

which is a specific and documented work product set.

Common SCI: Requirements specification,
Design specification, source code,
test plan, test case, user's manual.

Construction software tools and software running environment is also often included in the scope of configuration management.

12.2 Terminology

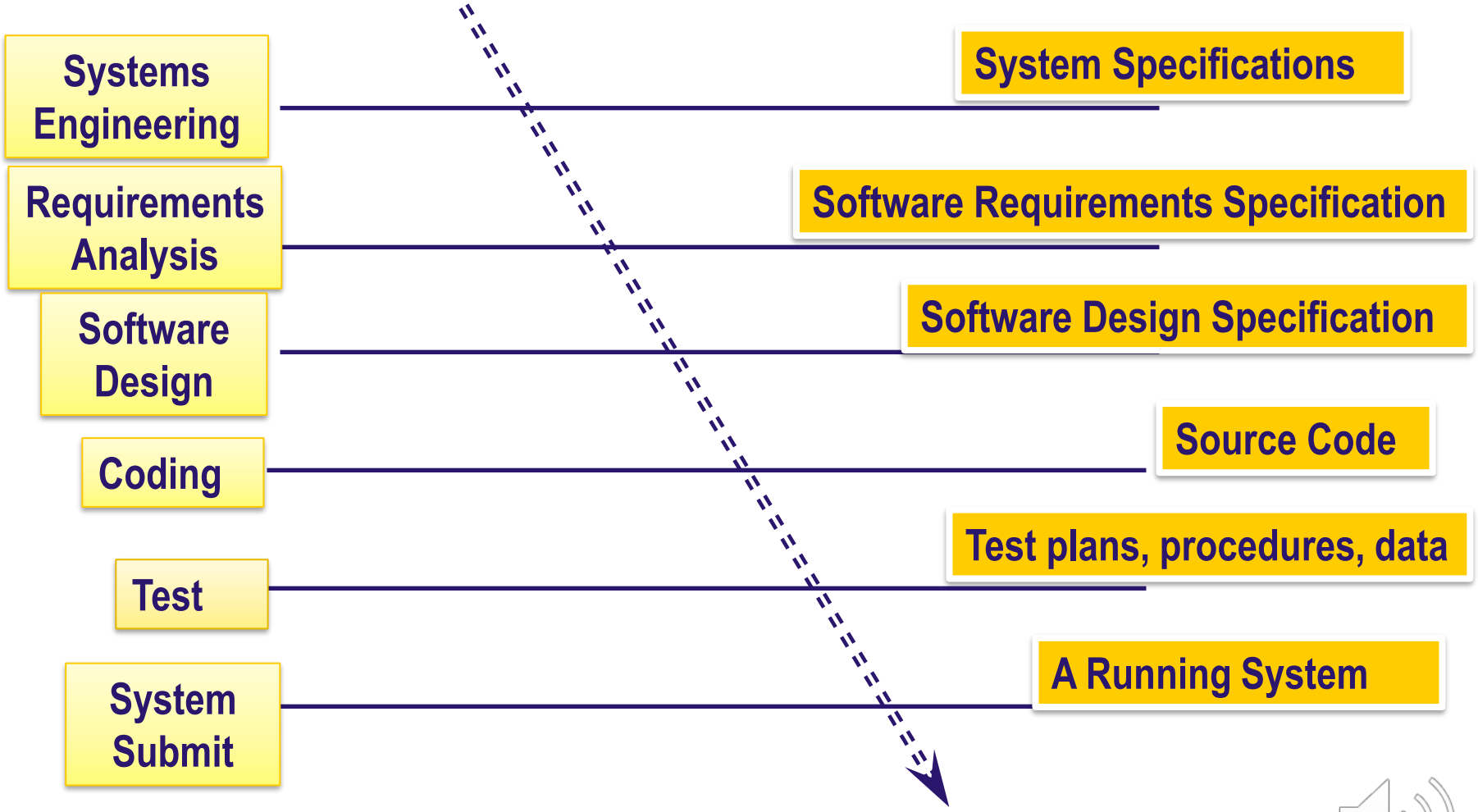
Baseline

It is the formally reviewed and approved rule and product, which can be used as a basis for further development, and can only be changed through a formal change control process

Baseline usually marks the end of a development phase.

12.2 Terminology

Baseline of each development phase



12.2 Terminology

Version

The initial release or re-release of a configuration item associated with a complete compilation or recompilation of the item. Different versions have different functionality.

Revision

Change to a version that corrects only errors in the design/code, but does not affect the documented functionality

12.2 Terminology

Release

The formal distribution of an approved version

Software Configuration Control Board (SCCB)

The organization responsible for managing the software configuration item changes

12.3 Software Configuration Management Process

Seven basic activities

① Make a configuration management plan

② Identify and flag configuration items

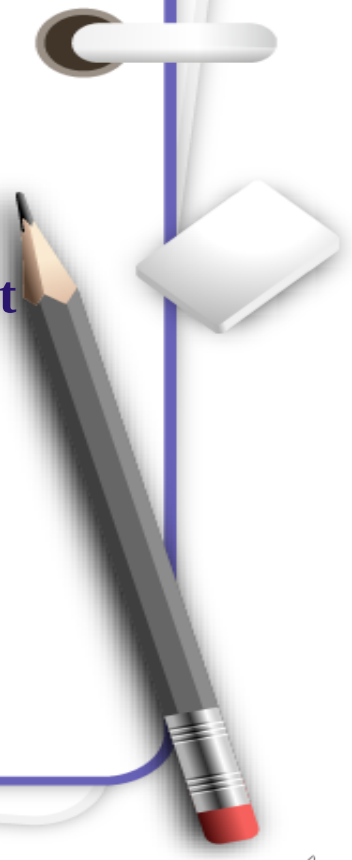
③ Set up configuration management environment

④ Version control for configuration items

⑤ Baseline change management

⑥ Configuration auditing

⑦ Configuration status statistics



12.3 Software Configuration Management Process

Tasks for Configuration Managers

- Write the SCMP
- Define configuration items
- Define promote /release policies
- Define activities and responsibilities

12.3 Software Configuration Management Process

Outline of a Software Configuration Management Plan (SCMP, IEEE 828-2005)

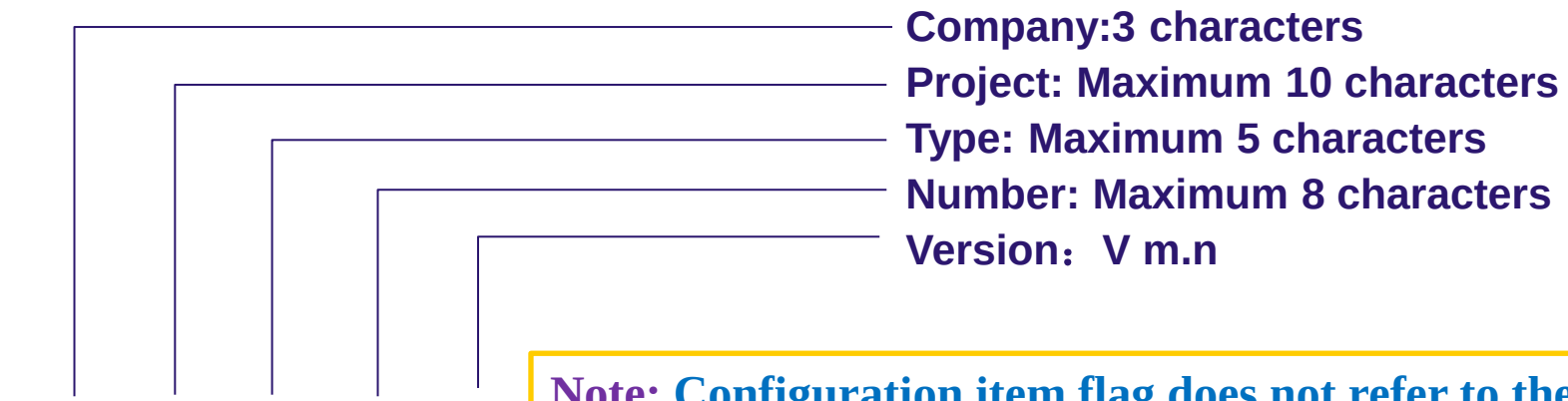
1. Introduction
   - Describes the Plan's purpose, scope of application, key terms, and references
2. SCM management (WHO?)
   - Identifies the responsibilities and authorities for managing and accomplishing the planned SCM activities
3. SCM activities (WHAT?)
   - Identifies all activities to be performed in applying to the project
4. 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

12.3 Software Configuration Management Process

Identification and flag configuration items

- **Define the work products under control as SCIs**
- **Assign an unique flag for each configuration item**
- **Establish the corresponding relationship between configuration items.**

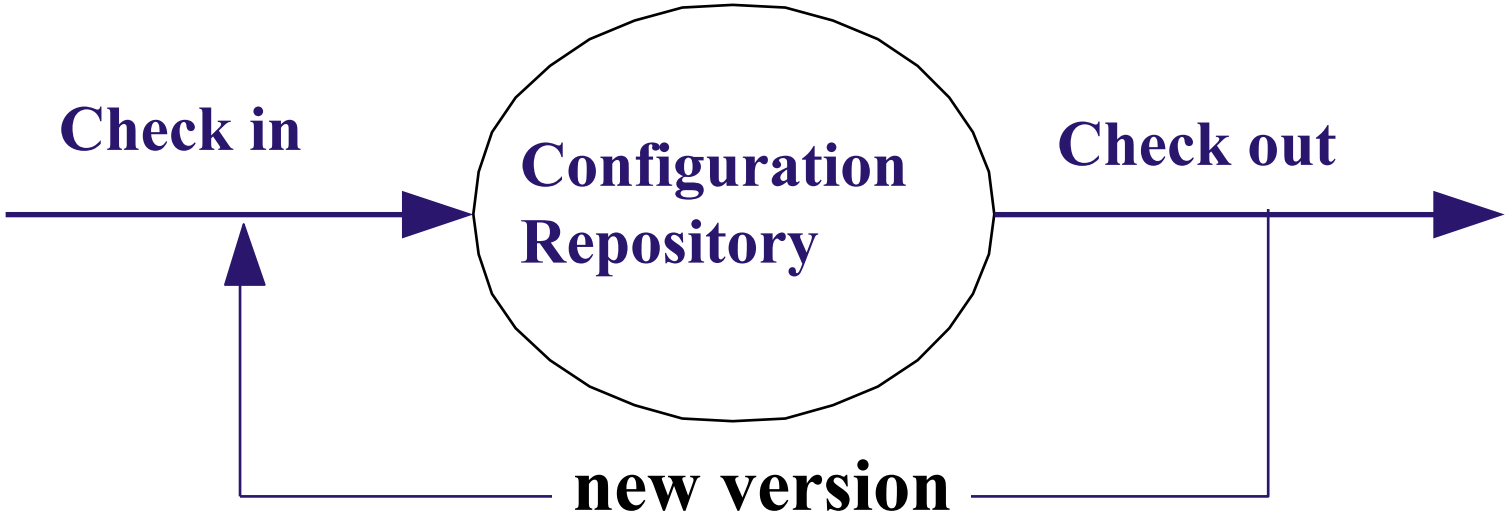
Example of configuration item flag specification



Note: Configuration item flag does not refer to the file name of the program / document file, and it actually refers to the configuration item identification of the program / document。

12.3 Software Configuration Management Process

Version control of configuration items

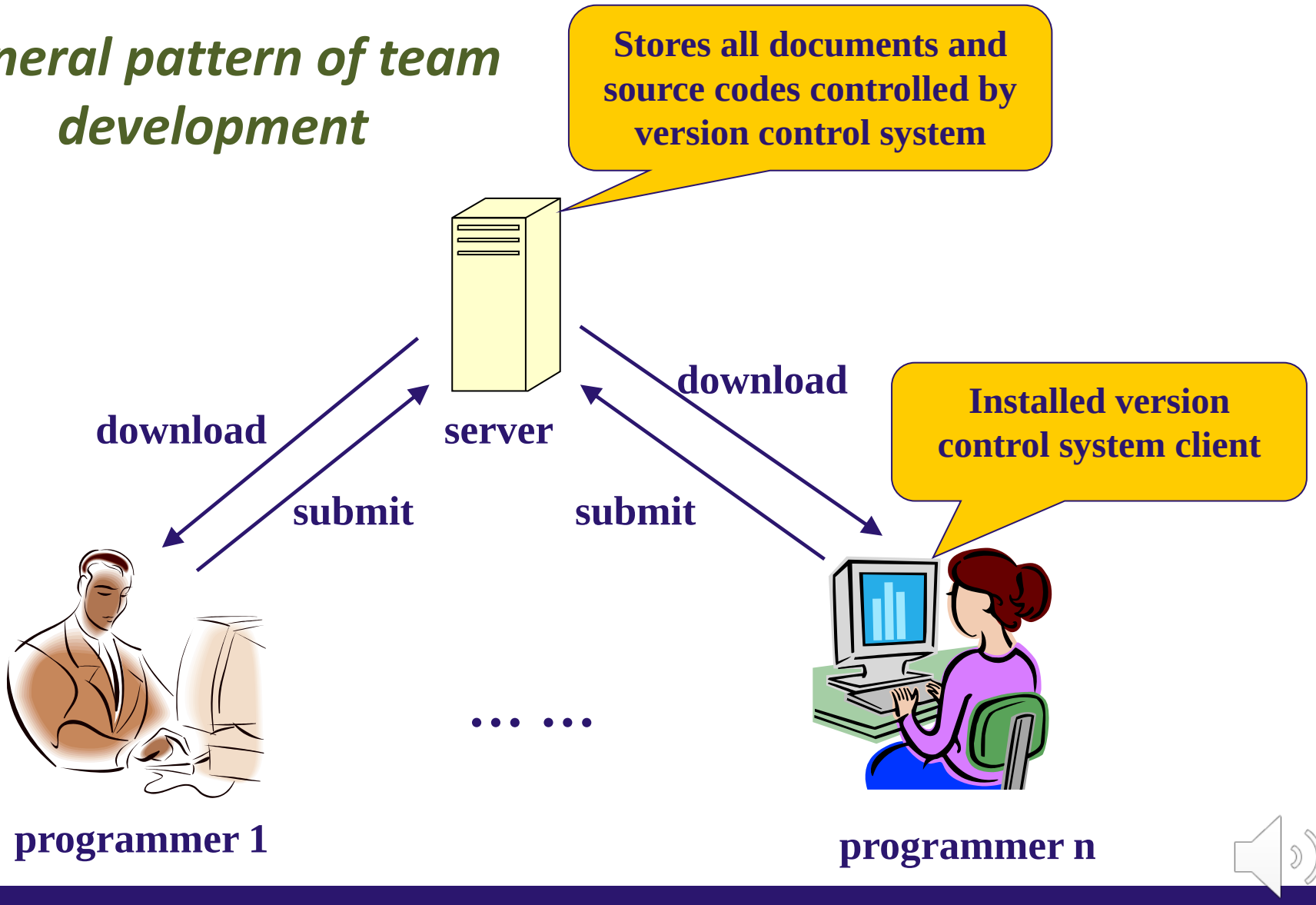


Configuration repository's check-in and check-out version control mechanisms have solve two important issues of the software development:

- **Access control: ensure that personnel with appropriate permissions can modify the configuration item**
- **Concurrency control: Ensure that different people at the same time to modify the configuration items will not overwrite each other.**

12.3 Software Configuration Management Process

General pattern of team development



12.3 Software Configuration Management Process

Software product version numbering method

- **1. Numeric sequence types for version number**
  - **Normal version number**

    e.g. x.y.z, x is the primary version number

    y is the feature version

    z is the defect repair version number
  - **α and β version number**

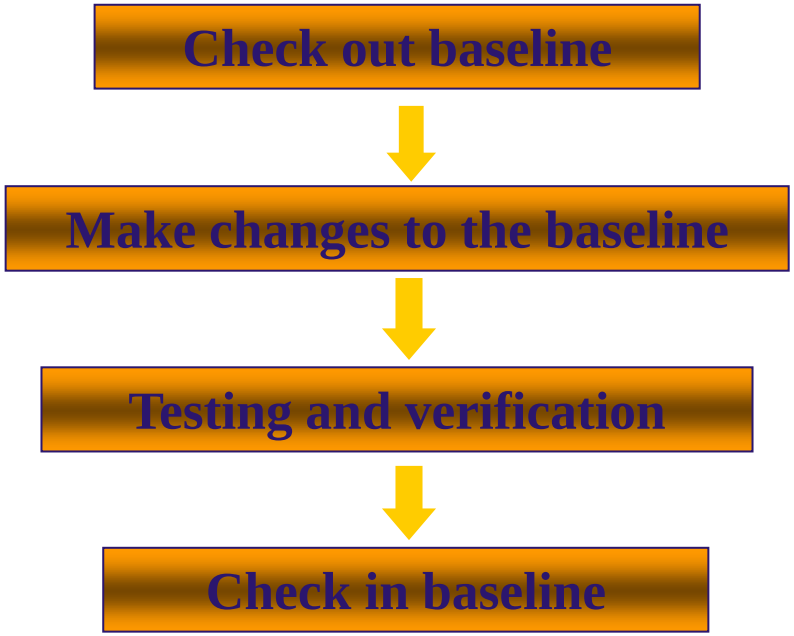
    e.g. 1.2.4A or 1.2.4B

    1.2.5A1 or 1.3.0B2
- **2. Attribute version number**
  - **e.g. J2SDK.v.l.2.2:10/31/2000-18:00, native threads, jit-122**

12.3 Software Configuration Management Process

Baseline change management process

Change implementation



12.4 Software Configuration Management Tool

Software configuration management tool's main functions

- **Version control**
- **Change management**
- **Configuration Audit**
- **State statistics (queries and reports)**
- **Issue tracking (tracking defects and change)**
- **Access control and security control**

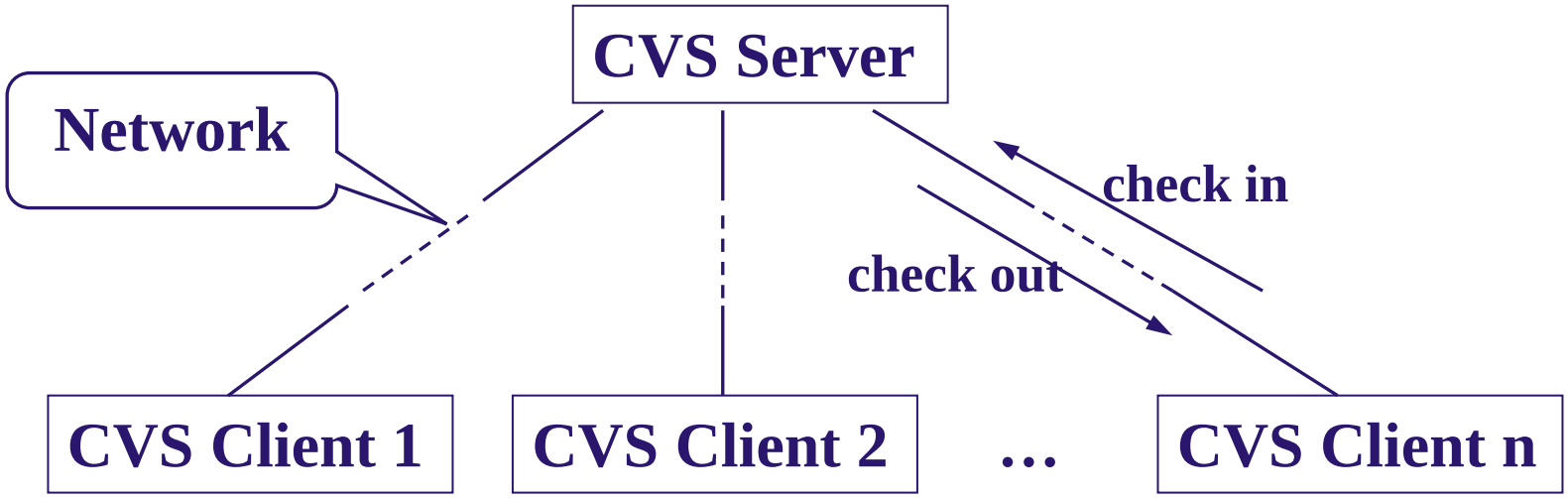
12.4 Software Configuration Management Tool

Common configuration management tools

- **Clear Case & Clear Quest**
- **Current Versions System (CVS)**
- **Subversion (SVN)**
- **PVCS**
- **Harvest**
- **Visual SourceSafe (VSS)**

12.4 Software Configuration Management Tool

CVS is a widely used configuration management tool, a free software.



Chapter 12 Summary

A. Understand the role of software configuration management

B. Understanding the related terminologies

C. Understanding software configuration management processes and tools