Lab: Version Control System and SVN

NetDB

CS, NTHU,

Fall, 2013

Outline

- Why do we need version control?
- Introduction to SVN
- Using SVN Client in Eclipse
- Exercise and Homework Submission

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Why Do We Need Version Control?

- A place to store the projects
- Synchronization between modifications made by different developers
- Even when you are developing a project along, SVN still helps in showing your revision history

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- Why do we need version control?
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Introduction to SVN

- “Subversion” in short
- An open-source version control system
  - To record every changes made to files (data/code) and directories
    - Who made a change?
    - What has been changed?
    - When did they make it?
    - Why did they make it?
  - To allow the recovery of older versions
  - To trace the history of how your data/code changed
  - To collaboratively edit and share data/code

Repository and Workspace

Central Repository

Synchronization
&
Version Control

Local Workspace 1

Local Workspace 2

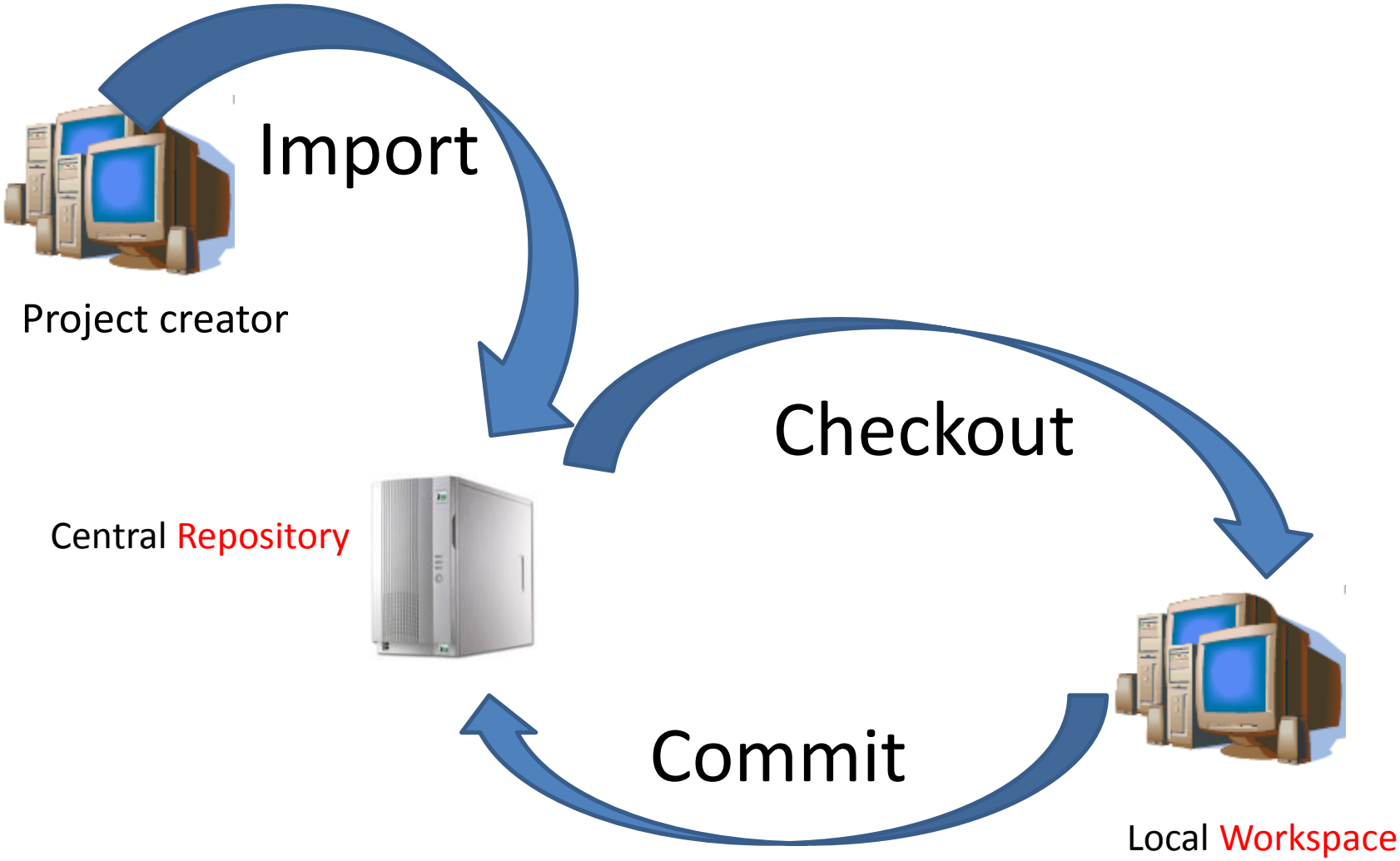
Store data/code and all change history in the central repository.

Load data/code, and develop and fix them at local worksapce.

Repository

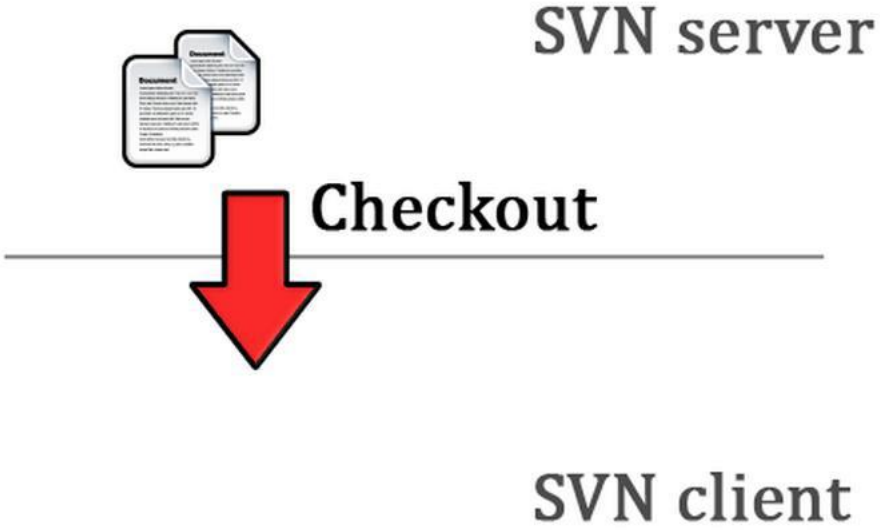
- SVN repository can be built on different protocols (e.g. svn, http, https)
- Each directory or file has a unique URL
  - **E.g.** https://netdb.cs.nthu.edu.tw/svn/SoftwareStudio_prj/
- Some SVN clients to access the repository:
  - Web browser
  - TortoiseSVN
  - Subclipse

How to Interact with the Repository?



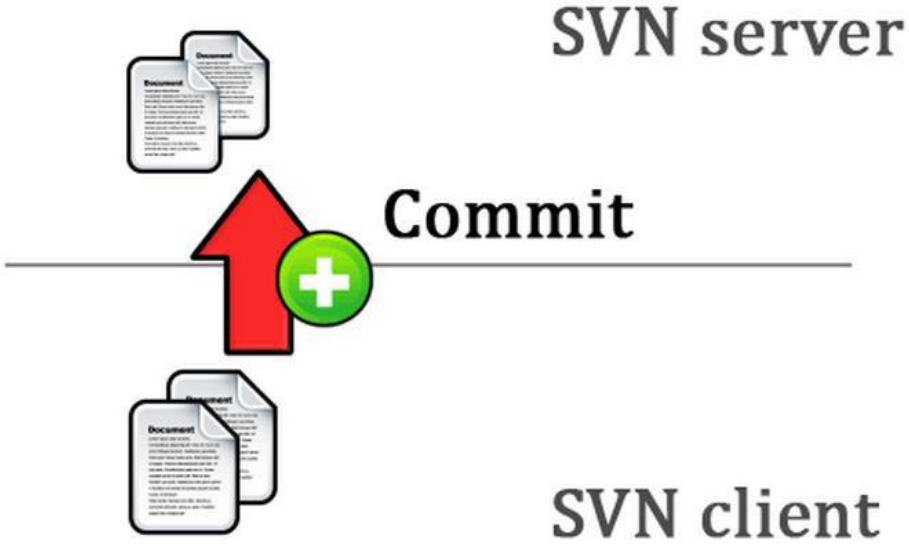
Checkout

- Checkout repository to create a working copy in local workspace
- Checked out files appear to be a directory with program's source



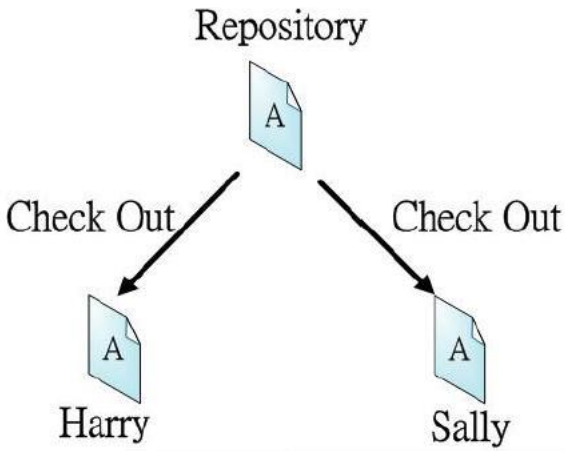
Commit

- Find changes made since checkout and commits them into the repository
- Creates a new revision number in the repository

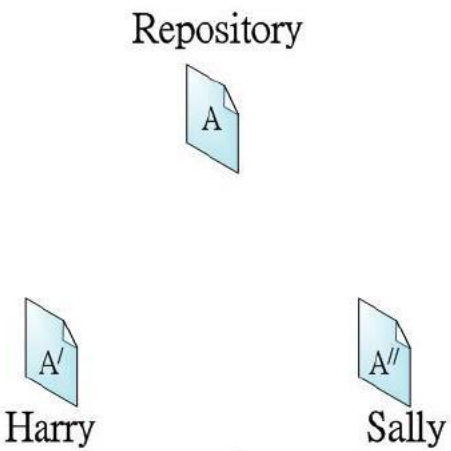


Conflict and Merge

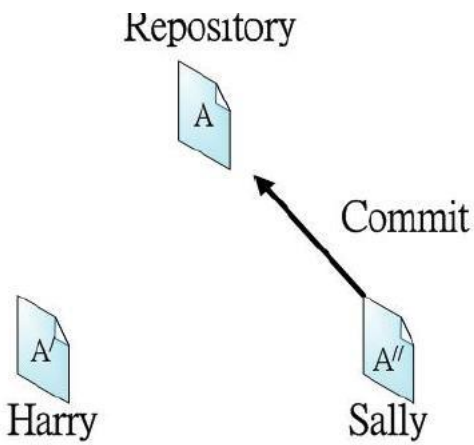
1. Checkout at the same time



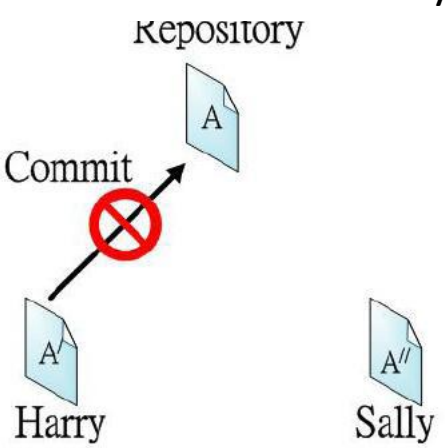
2. Each modifies his/her file



3. Sally commit first

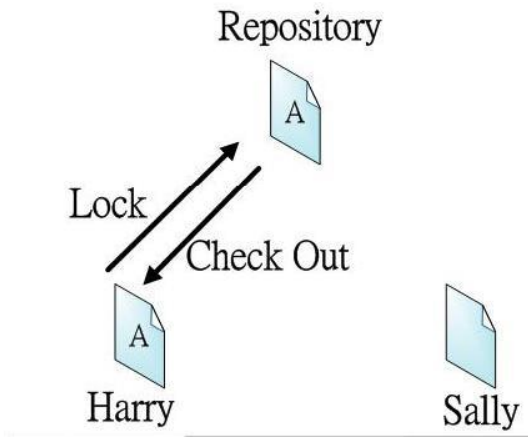


4. Out-Of-Date when Harry commit

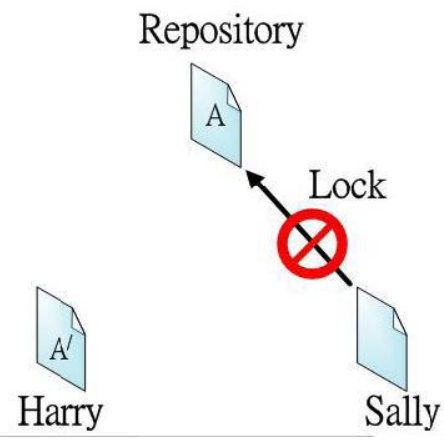


Conflict and Merge (Sol.1)

1. Harry locks the file



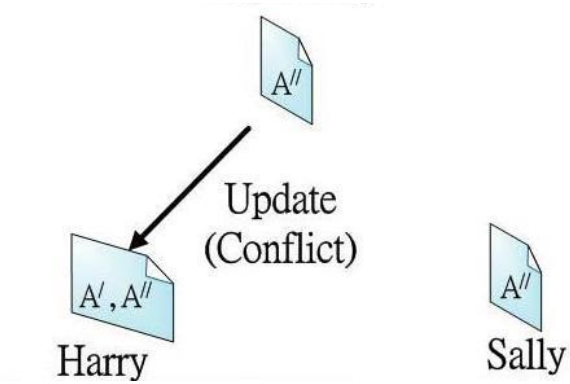
2. Sally can’t edit the file until unlocking



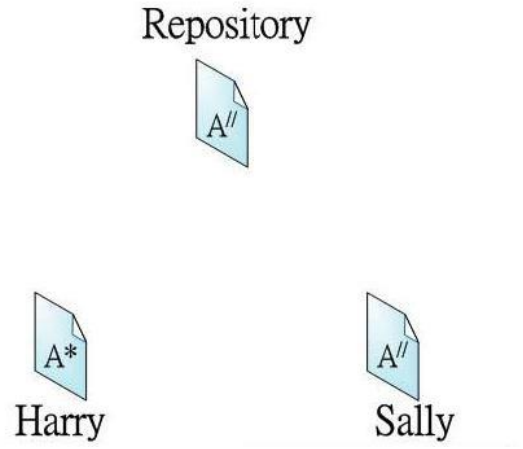
Conflict and Merge (Sol.2)

- This is the way SVN does

1. Harry commits and finds the file conflicting



2. Harry merges the differences between repository-file and his file and then re-commits



Outline

- Why do we need version control?
- Introduction to SVN
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- Exercise and Homework Submission

Using SVN in Eclipse

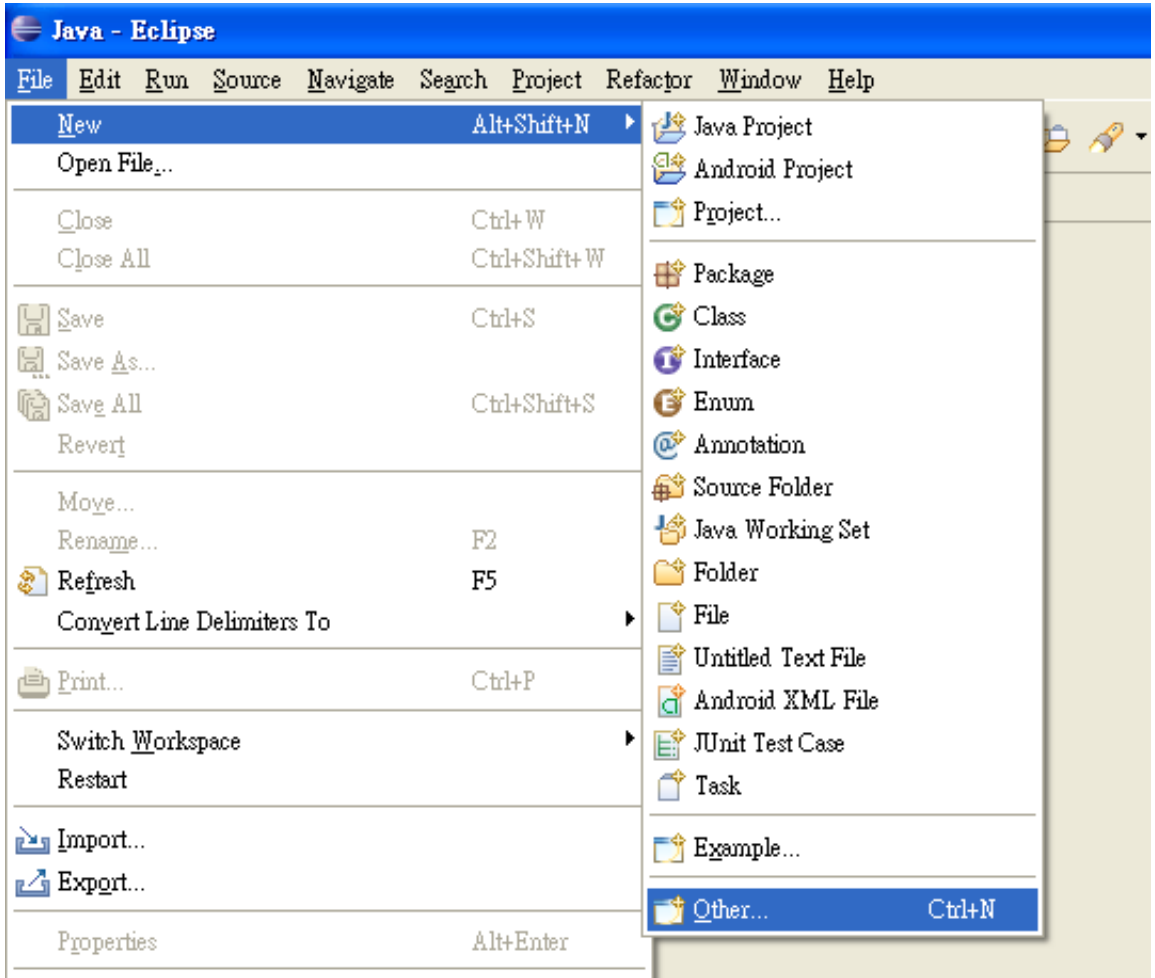
- Installing the Subclipse plugin (see appendix B on the course website)
  - A built-in SVN client in eclipse
- Subclipse operations in eclipse
  - “Checkout” a project
  - “Commit” your code from eclipse
  - “Import” project to repository

Authentication Required

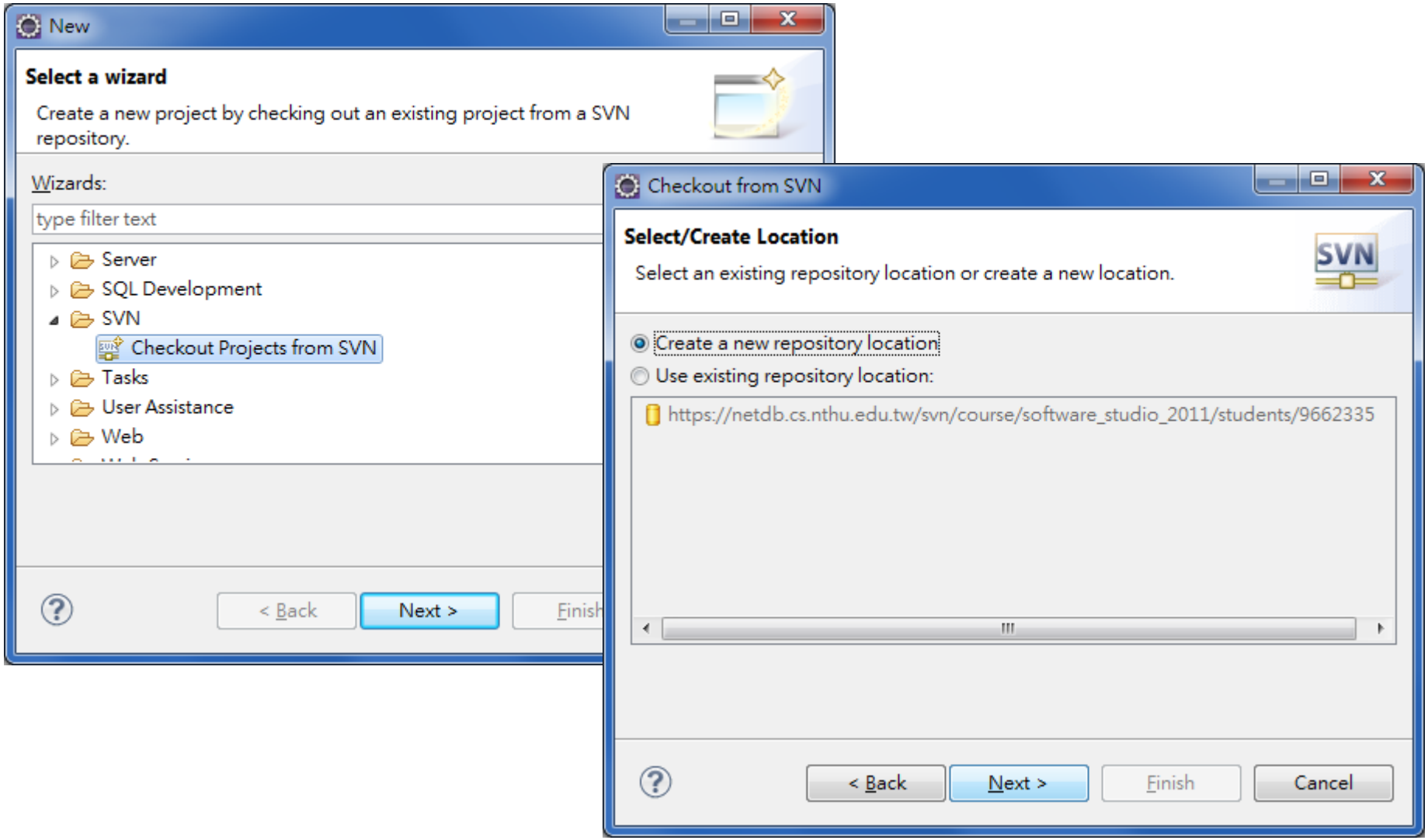
- Account:
  - Your student ID
- Password:
  - Your student ID by default
  - Change it using this page: https://netdb.cs.nthu.edu.tw/svntools/passwd/index.php

Checkout Project from Repository

- File -> New -> Other

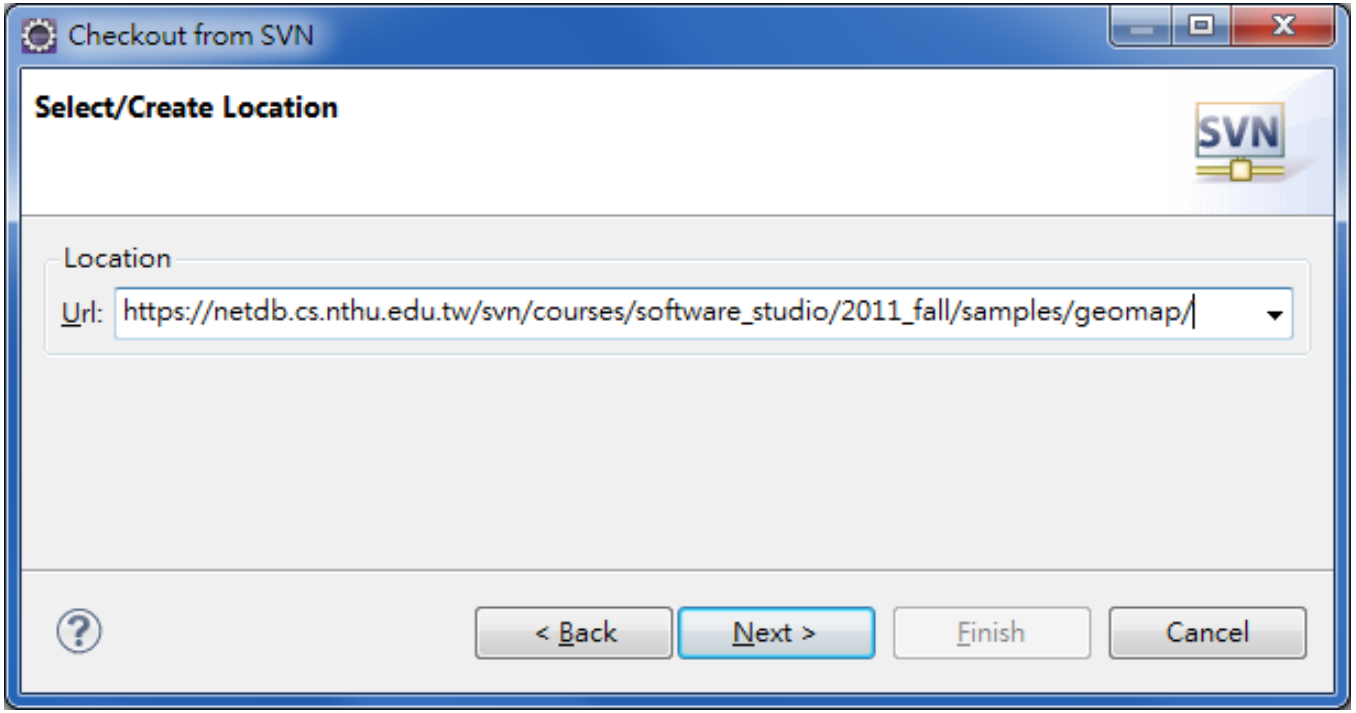


Checkout Project from Repository

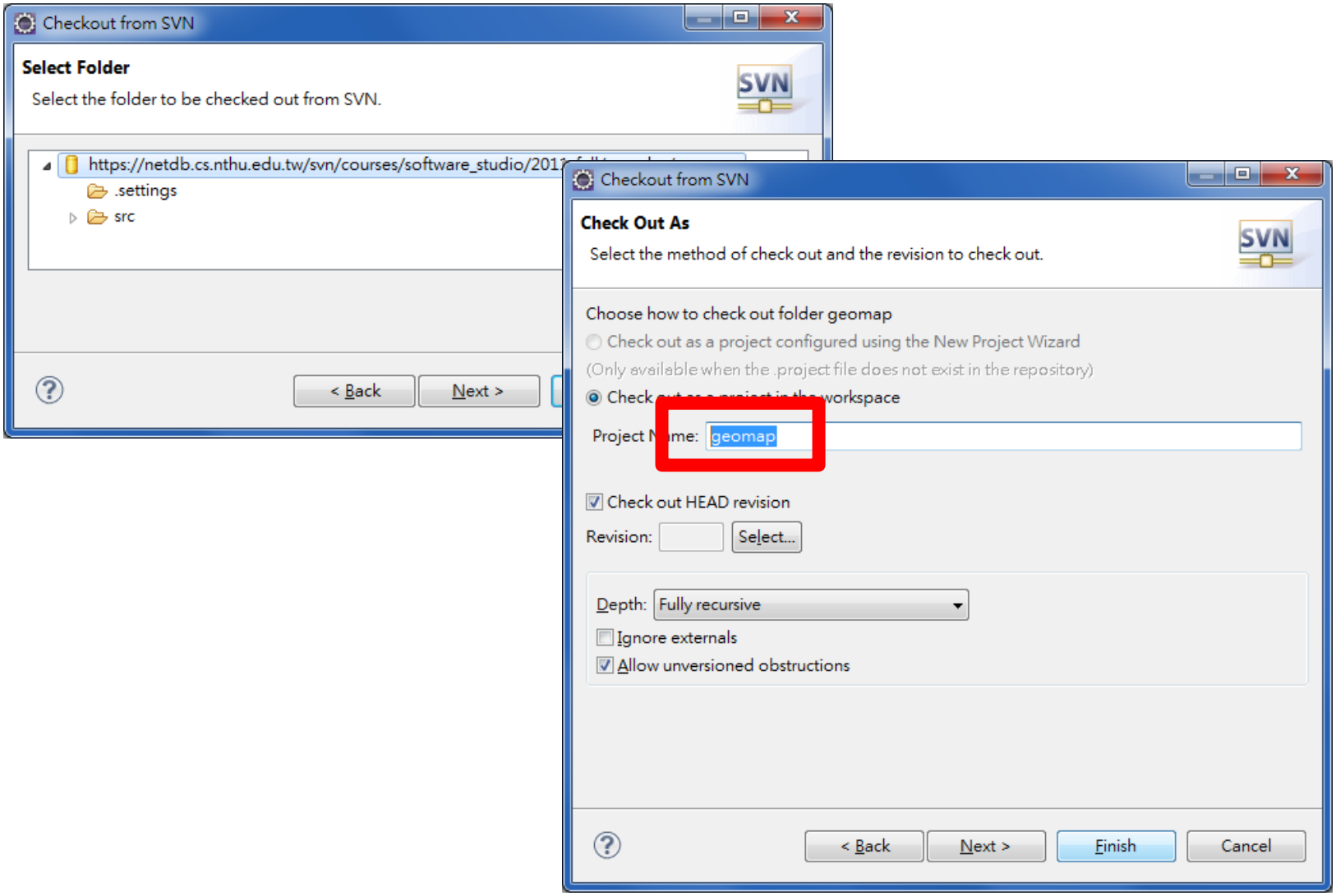


Checkout Project from Repository

- SVN Repository URL for sample projects https://netdb.cs.nthu.edu.tw/svn/courses/software_studio/2013_fall/samples/

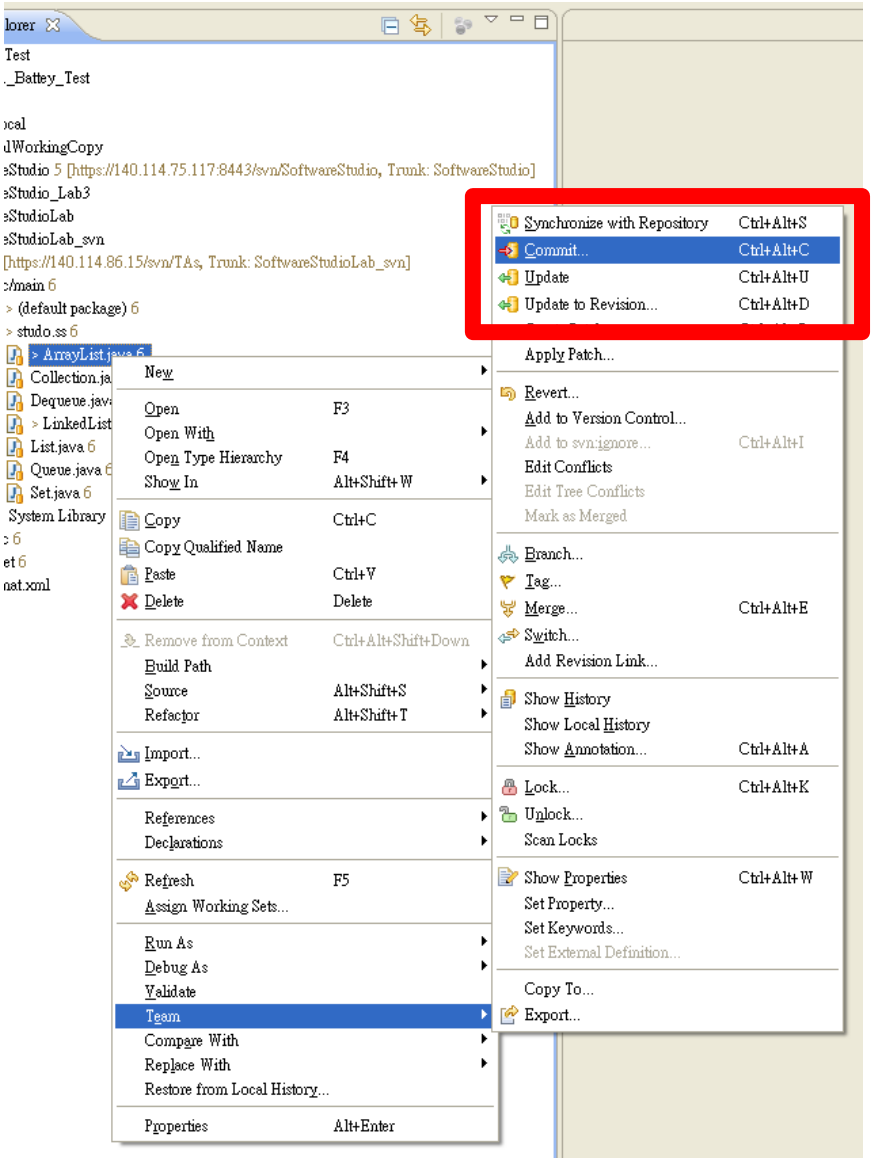


Checkout Project from Repository



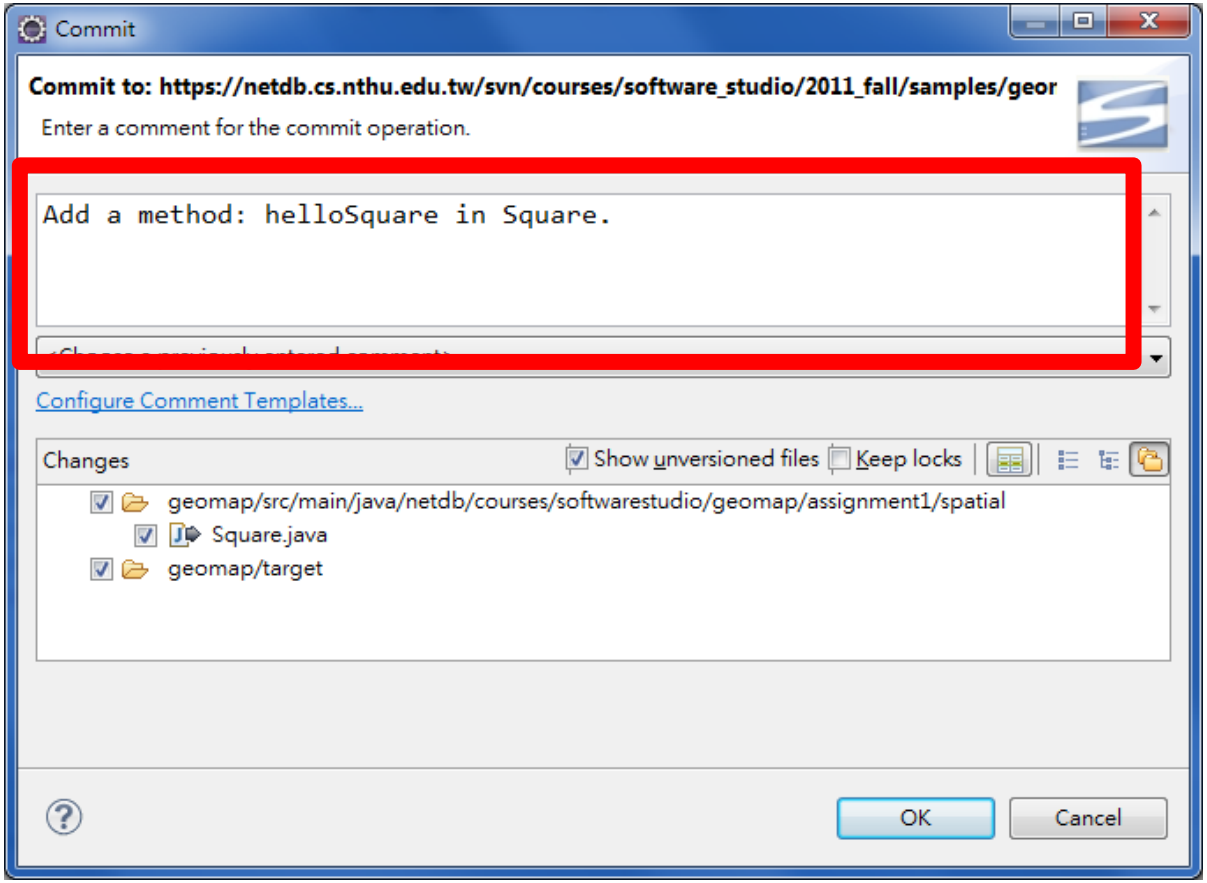
Commit Changes to Repository

- Checked-out projects are connected to SVN
- Changes can be committed back
  - Right click -> Team -> Commit
- You can commit either files or directories



Commit Changes to Repository

- It is a good practice to always comment on the changes you made

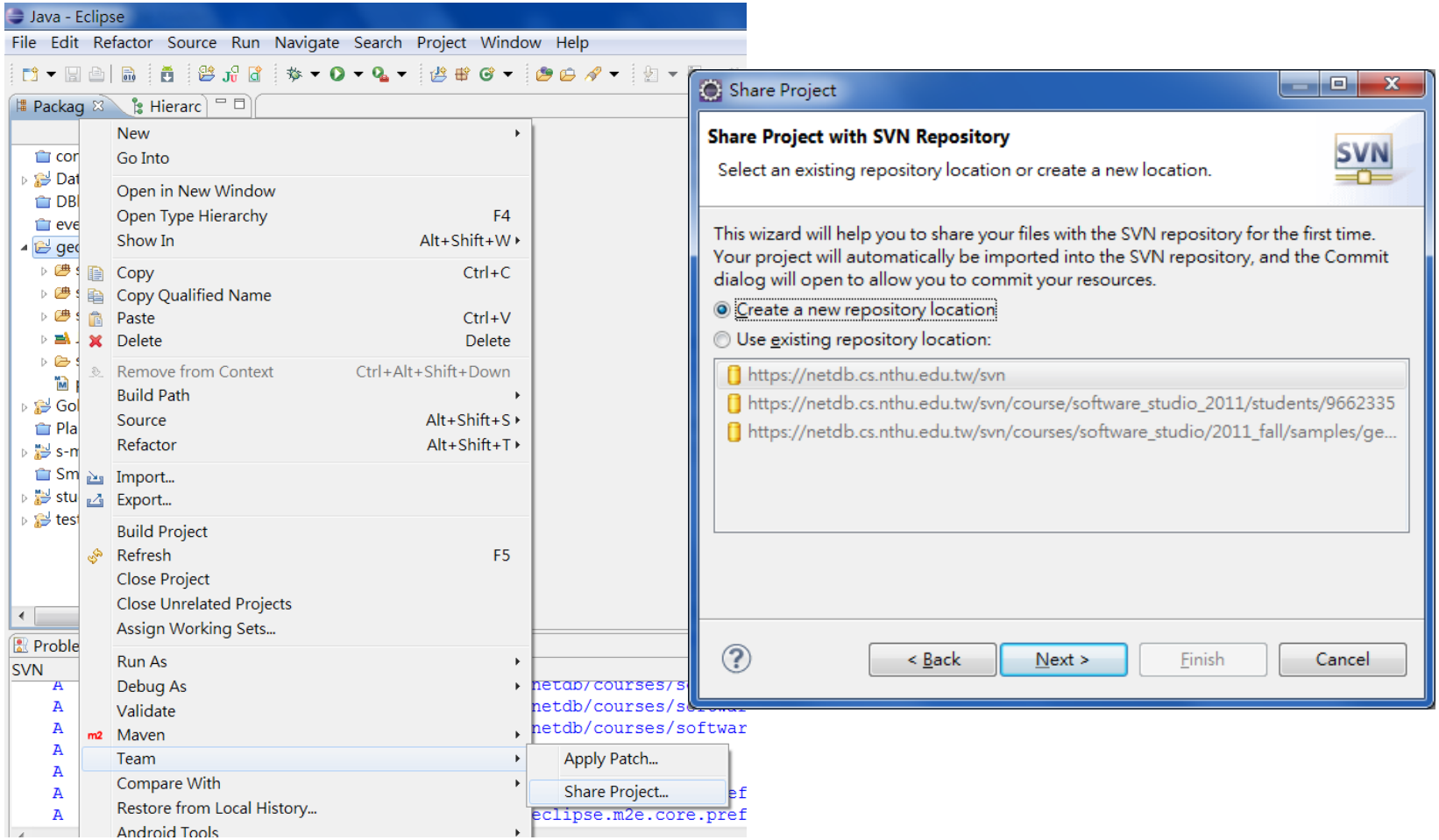


Import Project to Repository

- How to create projects on the SVN server?
  - Create a local project
  - "Import" it into SVN

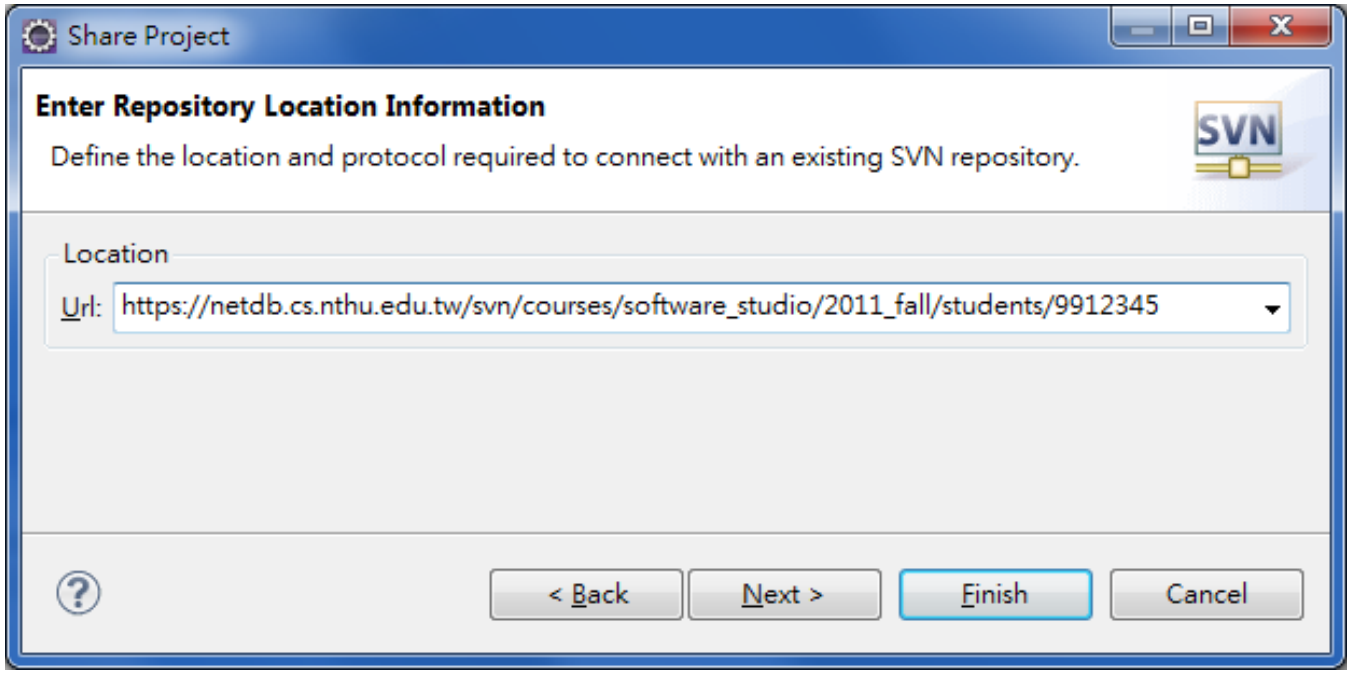
Import Project to Repository

- Right click the project -> Team -> Share Project



Import Project to Repository

- https://netdb.cs.nthu.edu.tw/svn/courses/software_studio/2013_fall/students/${your-id}

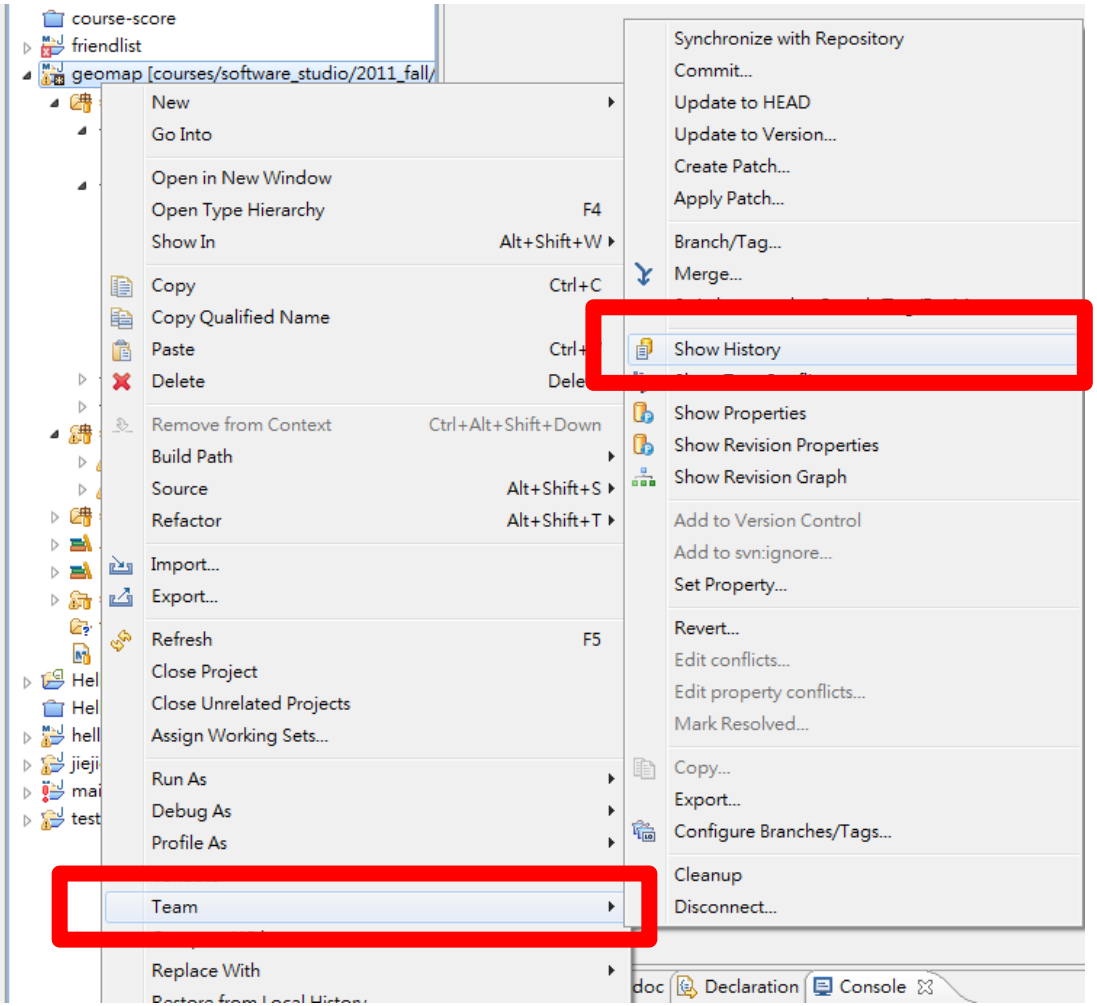


What's Next?

- View the revision history
- Lookup differences while conflicting
- Switch to older versions

Revision History

- Right click -> Team -> Show history



Revision History

Problems | @ Javadoc | Declaration | Console | History

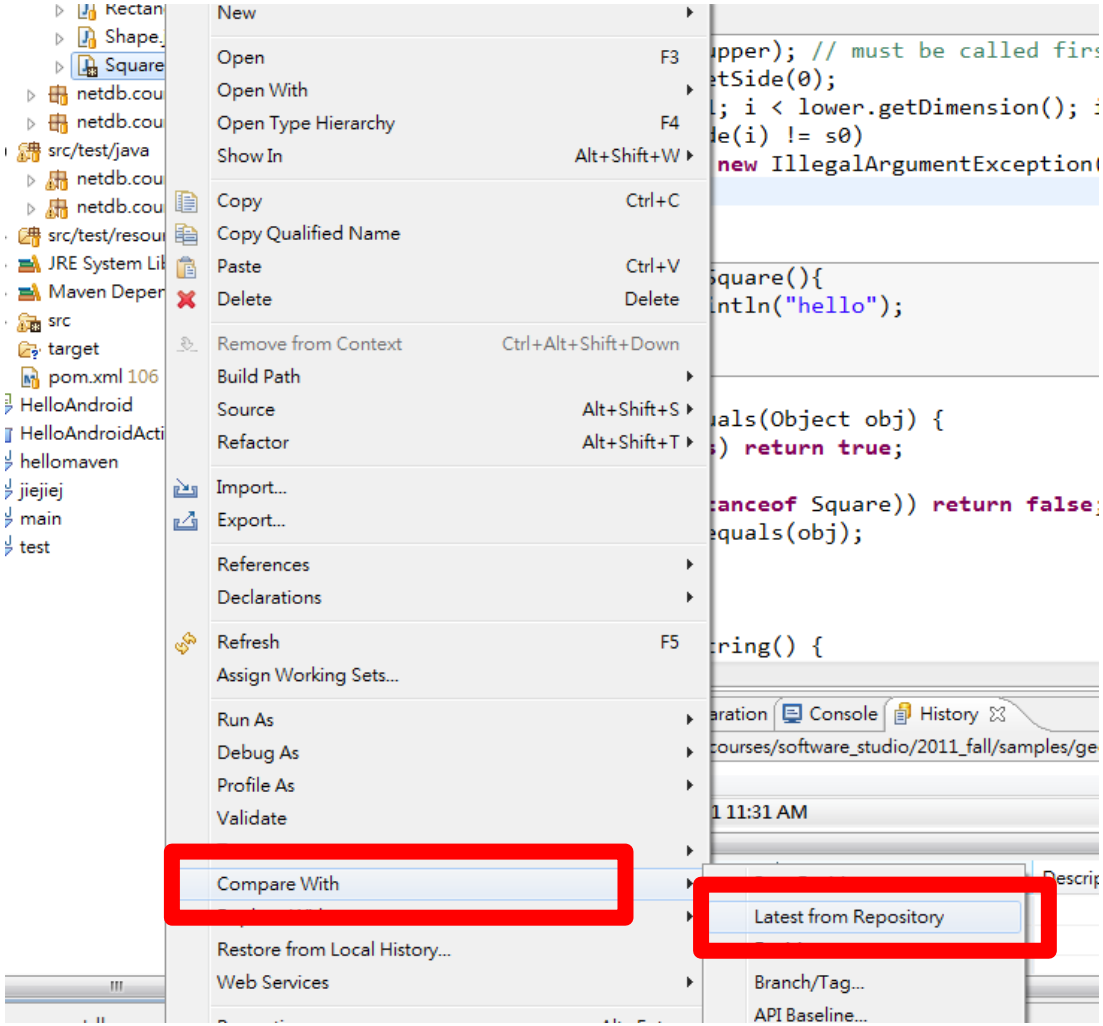
in https://netdb.cs.nthu.edu.tw/svn/courses/software_studio/2011_fall/samples/geomap

Revision	Date	Author	Comment
*106	10/17/11 11:31 AM	shwu	Initial commit.
105	10/17/11 11:31 AM	shwu	Initial import.

Action	Affected paths	Description
A	/courses/software_studio/2011_fall/samples/geomap/.cl...	
A	/courses/software_studio/2011_fall/samples/geomap/.pr...	
A	/courses/software_studio/2011_fall/samples/geomap/.se...	
A	/courses/software_studio/2011_fall/samples/geomap/.se...	
A	/courses/software_studio/2011_fall/samples/geomap/.se...	

```
Initial commit.
```

Lookup Difference



- Right click -> Compare with -> …
- We can lookup the differences between
  1. Local files
  2. Local file and file in repository

Lookup Difference

Local file

File in the repository

Java Source Compare

Workspace file: Square.java

```
        super(lower, upper); // must be called first
        double s0 = getSide(0);
        for (int i = 1; i < lower.getDimension(); i++) {
            if (getSide(i) != s0)
                throw new IllegalArgumentException();
        }
    }

    public void helloSquare(){
        System.out.println("hello");
    }

    public boolean equals(Object obj) {
        if(obj == this) return true;

        if (!(obj instanceof Square)) return false;
        return super.equals(obj);
    }

    @Override
    public String toString() {
```

Repository file: Square.java

```
        super(lower, upper); // must be called first
        double s0 = getSide(0);
        for (int i = 1; i < lower.getDimension(); i++) {
            if (getSide(i) != s0)
                throw new IllegalArgumentException();
        }
    }

    @Override
    public boolean equals(Object obj) {
        if(obj == this) return true;

        return super.equals(obj);
    }

    @Override
    public String toString() {
        StringBuffer ret = new StringBuffer("Square@{");
        ret.append(lower.toString());
        ret.append(", " + upper.toString() + "}");
        return ret.toString();
```

Different part will covered by a box

Merging Conflicts

- What to do when conflicts occur at commit time?
  - You must resolve conflicts before proceeding
- First, lookup the differences
- Then you have options:
  - Modify your code locally, merge the changes, and commit merged version to SVN
  - Discard your changes by reverting your code to an older version
  - Contact other authors to modify/revert their code

Merging Conflicts

- Conflict when commit

```
Markers | Properties | Servers | Data Source Explorer | Snippets | Console | History
SVN
    Transmitting file data ...
    Committed revision 111.
commit -m "Add a method helloSquare() in Square." E:/Desktop/workspace/geomap/src/main/java/netdb/cour
    Sending        E:/Desktop/workspace/geomap/src/main/java/netdb/courses/softwarestudio/geomap/assig
    svn: Commit failed (details follow):
svn: File or directory 'Square.java' is out of date; try updating
svn: resource out of date; try updating
svn: CHECKOUT of '/svn/!svn/ver/111/courses/software_studio/2011_fall/students/9912345/geomap/src/main
```

Merging Conflicts

- Lookup Difference

Structure Compare

geomap
src
main
java

Java Structure Compare

Compilation Unit
Square
helloSquare()

Java Source Compare

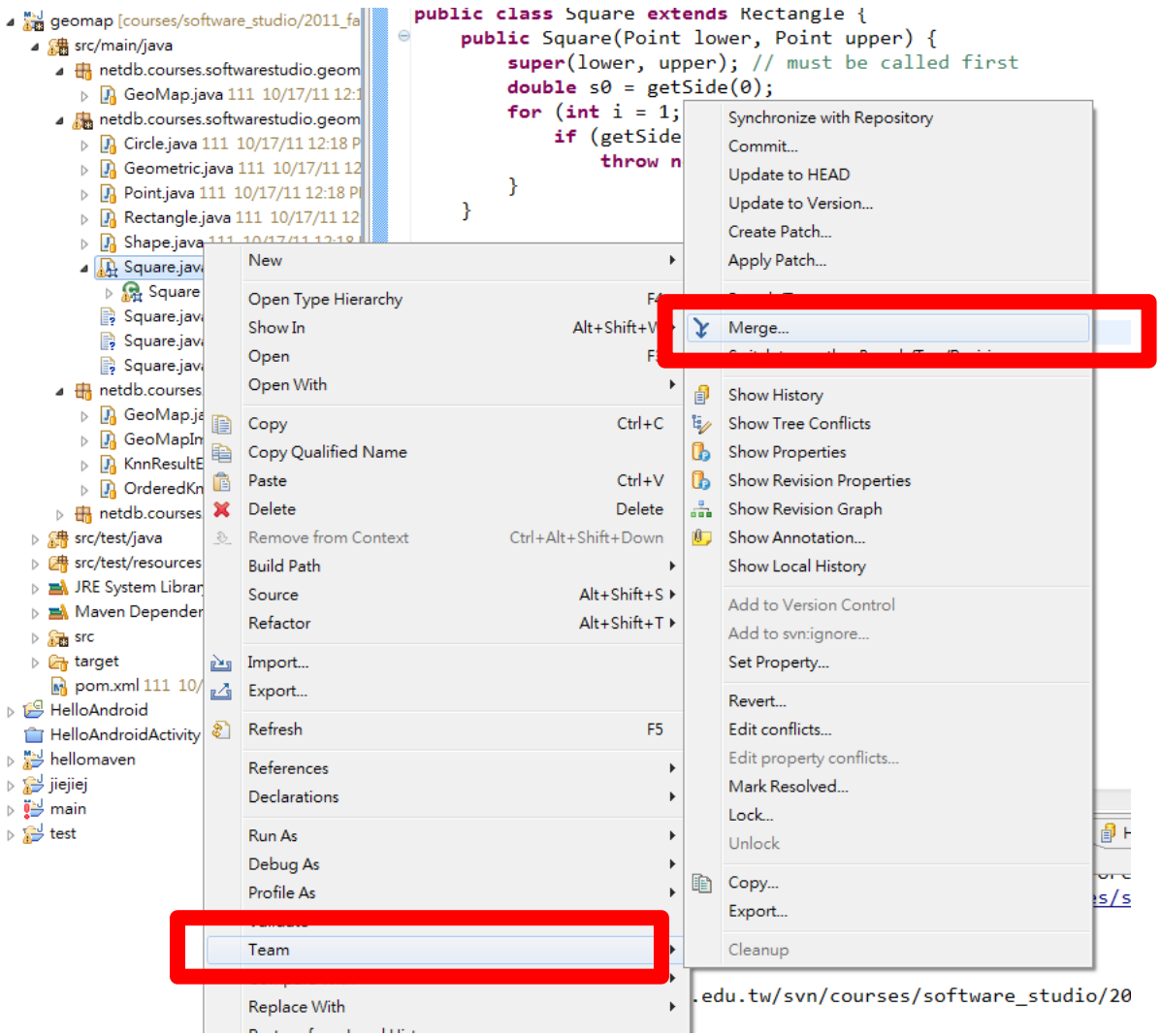
Workspace file: geomap

```
    public Square(Point lower, Point upper) {
        super(lower, upper); // must be called first
        double s0 = getSide(0);
        for (int i = 1; i < lower.getDimension(); i++) {
            if (getSide(i) != s0)
                throw new IllegalArgumentException();
        }
    }

    public void helloSquare(){
        System.out.println("Hello my square");
    }

    @Override
    public boolean equals(Object obj) {
        if(obj == this) return true;

        if (!(obj instanceof Square)) return false;
        return super.equals(obj);
    }

    @Override
    public String toString() {
        StringBuffer ret = new StringBuffer("Square@{");
        ret.append(lower.toString());
        ret.append(", " + upper.toString() + "}");
        return ret.toString();
```

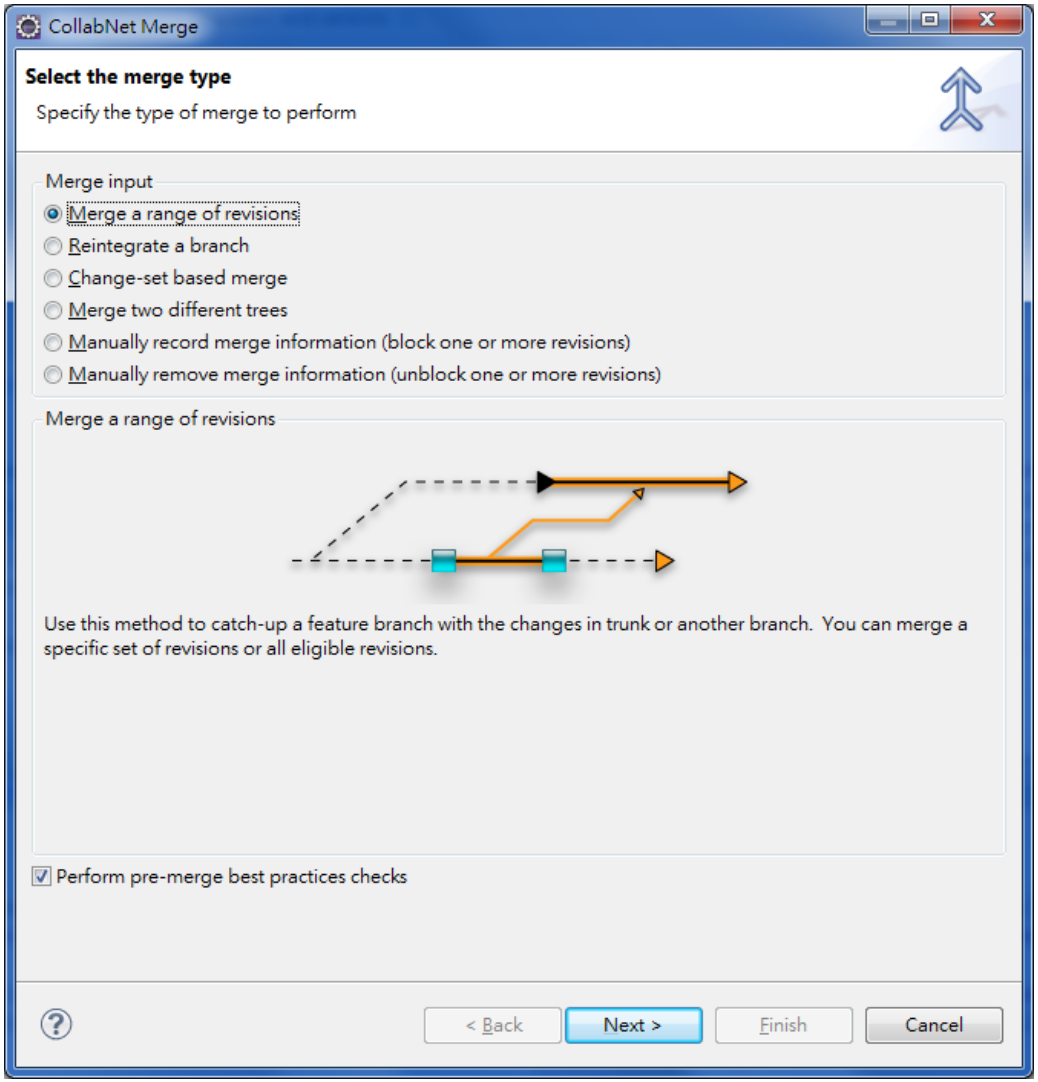
Repository file: geomap

```
    public Square(Point lower, Point upper) {
        super(lower, upper); // must be called first
        double s0 = getSide(0);
        for (int i = 1; i < lower.getDimension(); i++) {
            if (getSide(i) != s0)
                throw new IllegalArgumentException();
        }
    }

    public void helloSquare(){
        System.out.println("Hello 9912345");
    }

    @Override
    public boolean equals(Object obj) {
        if(obj == this) return true;

        if (!(obj instanceof Square)) return false;
        return super.equals(obj);
    }

    @Override
    public String toString() {
        StringBuffer ret = new StringBuffer("Square@{");
        ret.append(lower.toString());
        ret.append(", " + upper.toString() + "}");
        return ret.toString();
```

Merging Conflicts

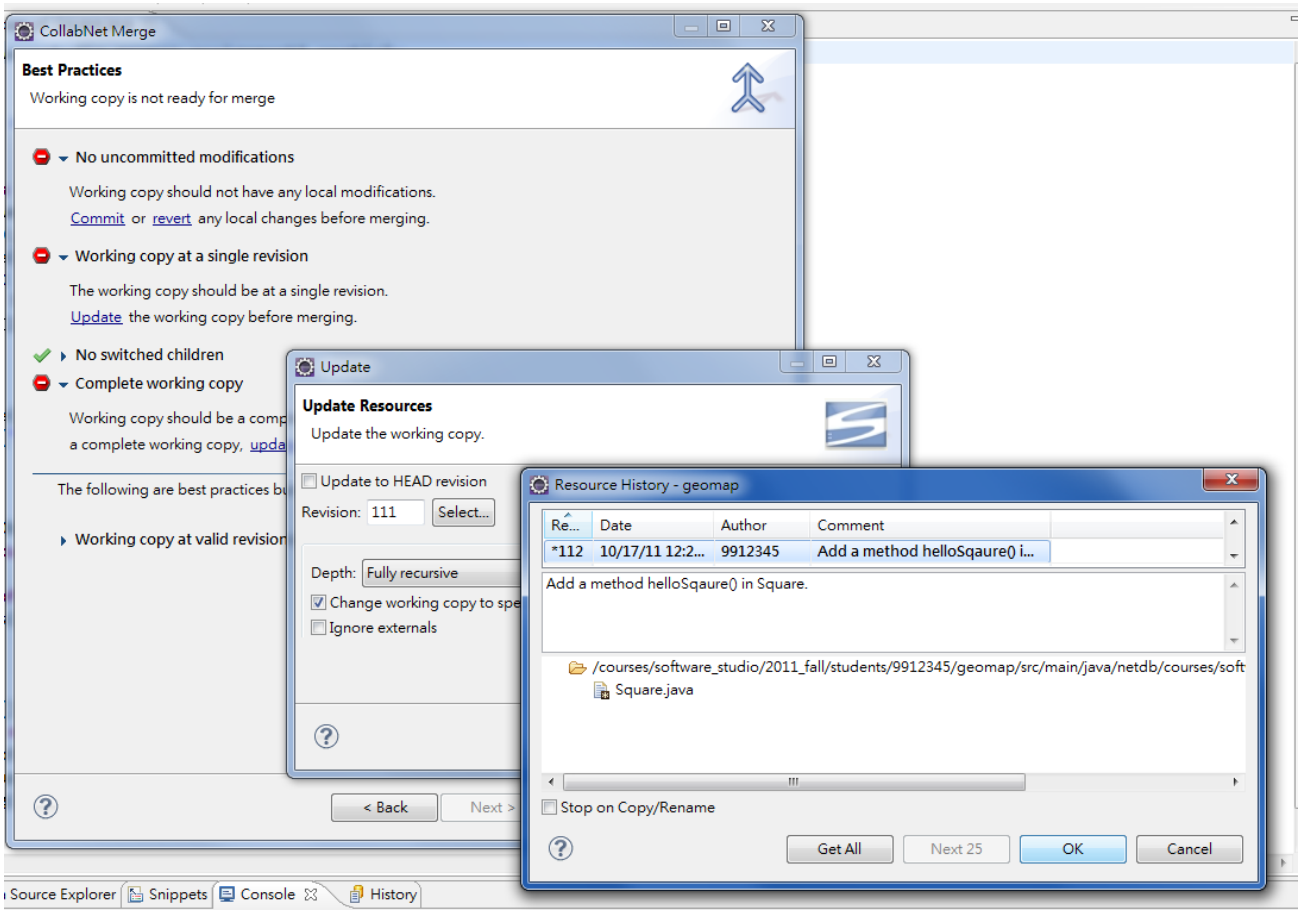


Merging Conflicts



Merging Conflicts

- There are options to process the merge.



Merging Conflicts

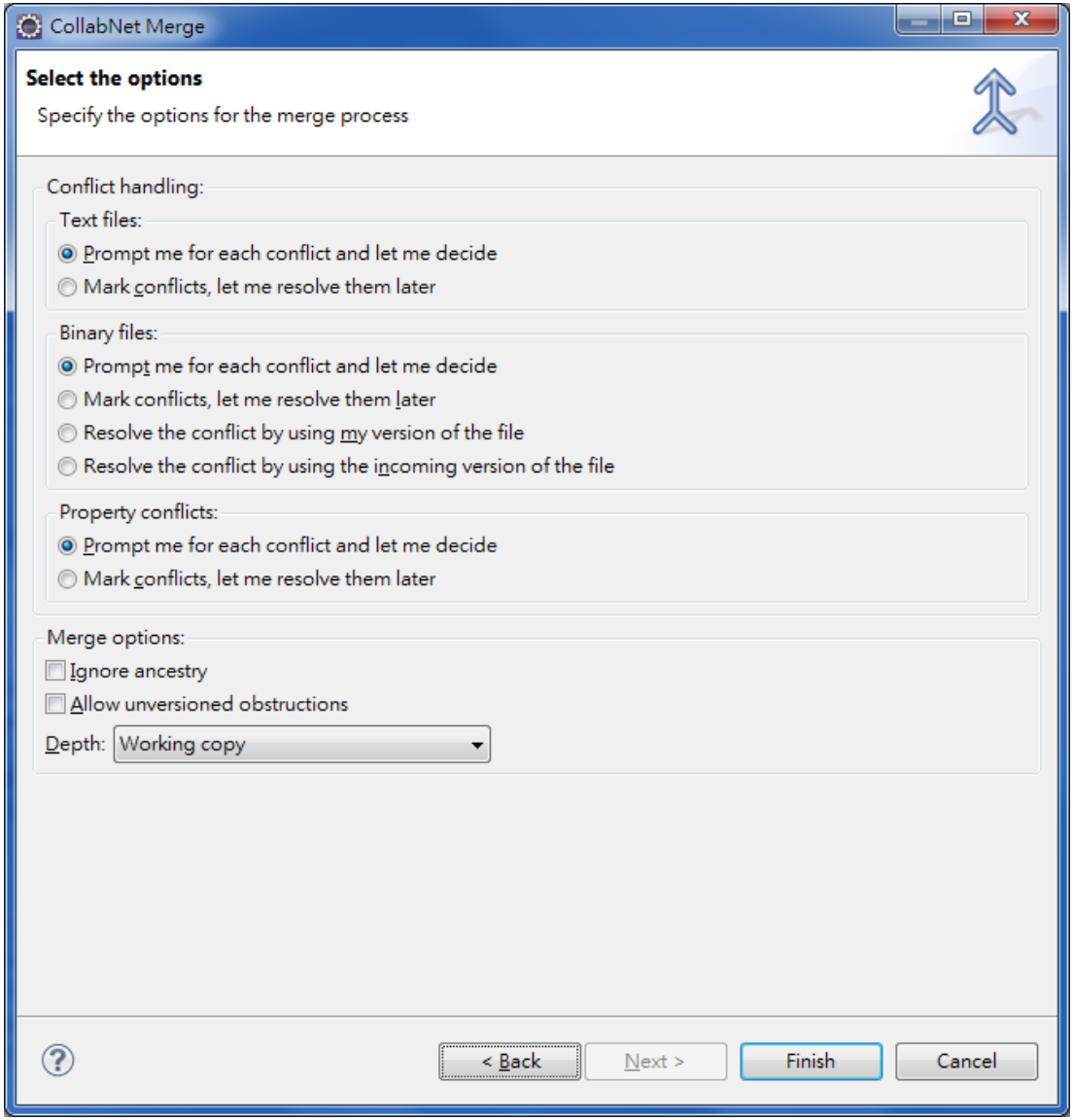
- The console will show the conflicts

Markers | Properties | Servers | Data Source Explorer | Snippets | Console | History

SVN

```
svn: CHECKOUT of '/svn/!svn/ver/111/courses/software_studio/2011_fall/students/9912345/geomap/src/main/java/n
update E:/Desktop/workspace/geomap -r 112 --depth=infinity --force
    C   E:/Desktop/workspace/geomap/src/main/java/netdb/courses/softwarestudio/geomap/assignment1/spatial/Squ
    Updated to revision 112.
    ==== Conflict Statistics: =====
    File conflicts: 1
```

Merging Conflicts



Merging Conflicts

GeoMap.java | *Square.java | copy_of_Square.java

```
 * A generalized square in a geometric space.
 *
 */
public class Square extends Rectangle {
    public Square(Point lower, Point upper) {
        super(lower, upper); // must be called first
        double s0 = getSide(0);
        for (int i = 1; i < lower.getDimension(); i++) {
            if (getSide(i) != s0)
                throw new IllegalArgumentException();
        }
    }

<<<<<<< .mine
    public void helloSquare(){
        System.out.println("Hello square");
    }

=======
    public void helloSquare(){
        System.out.println("Hello 9912345");
    }

>>>>>>> .r112
```

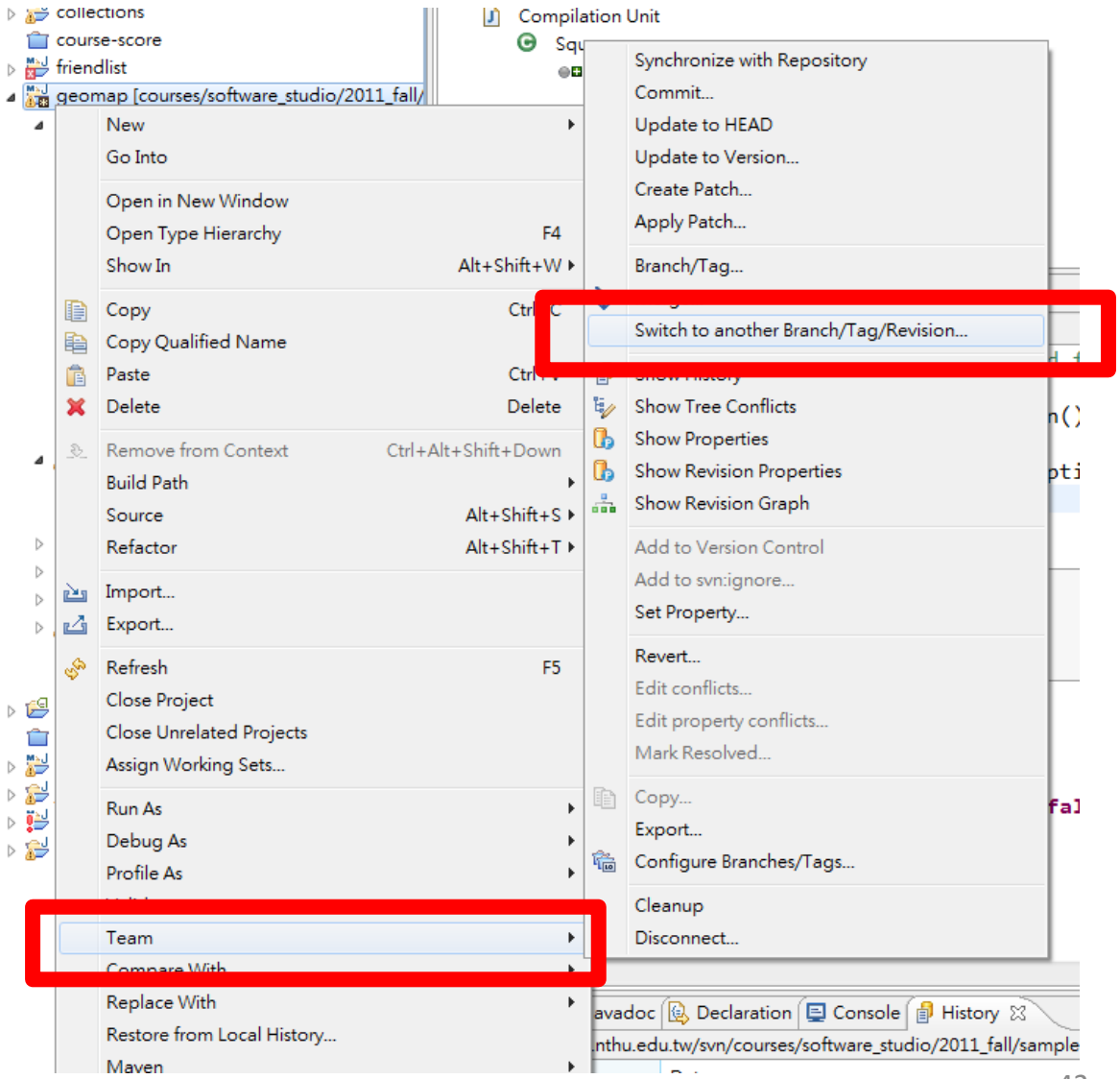
Merging Conflicts

- Commit it after the conflicts are resolved

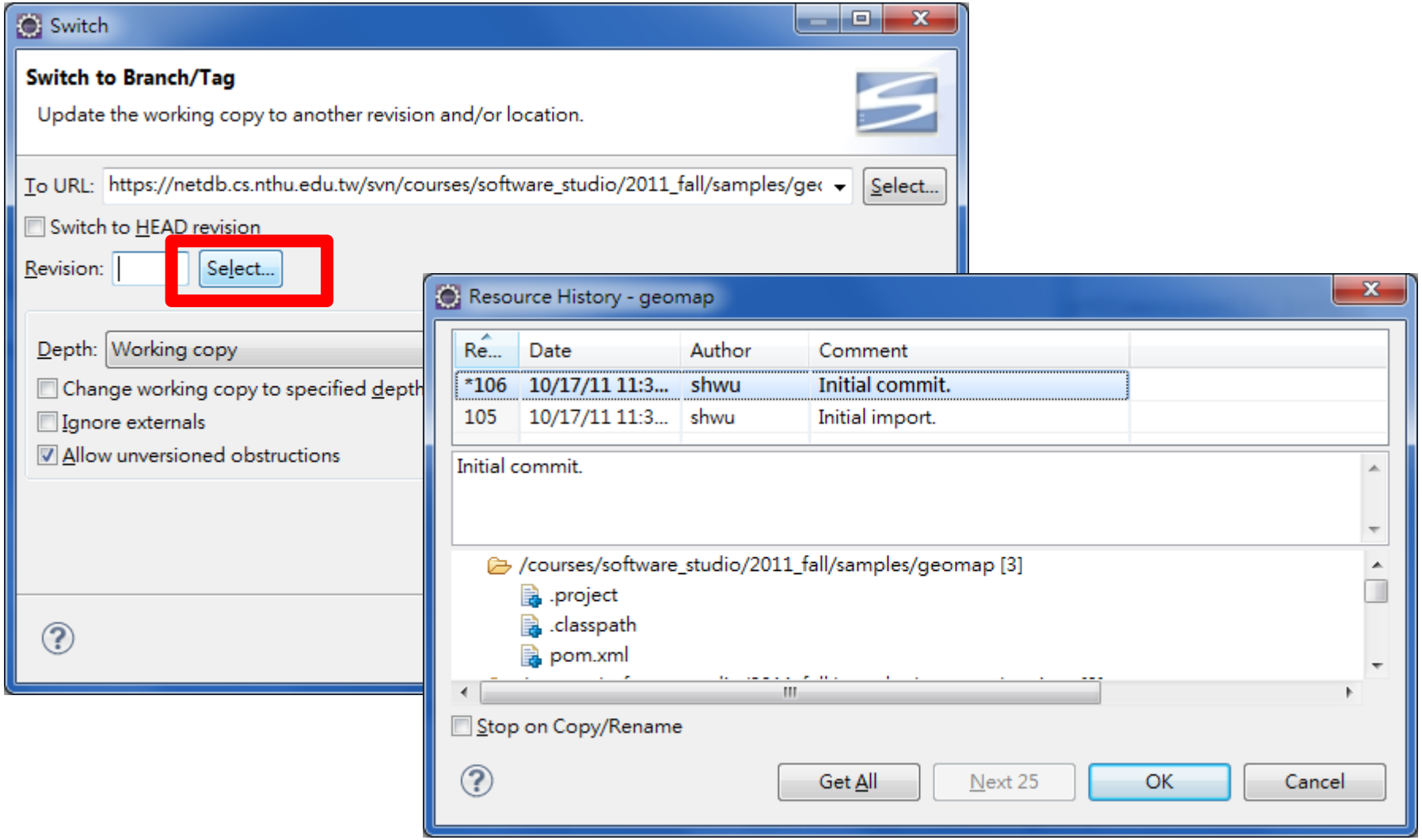
```java
 * A generalized square in a geometric space.
 *
 */
public class Square extends Rectangle {
    public Square(Point lower, Point upper) {
        super(lower, upper); // must be called first
        double s0 = getSide(0);
        for (int i = 1; i < lower.getDimension(); i++) {
            if (getSide(i) != s0)
                throw new IllegalArgumentException();
        }
    }

    public void helloSquare(){
        System.out.println("Hello 9912345's square");
    }

    @Override
    public boolean equals(Object obj) {
        if(obj == this) return true;

        if (!(obj instanceof Square)) return false;
        return super.equals(obj);
```

Switch to Older Versions

- Right click -> Team -> Switch



Switch to Older Versions



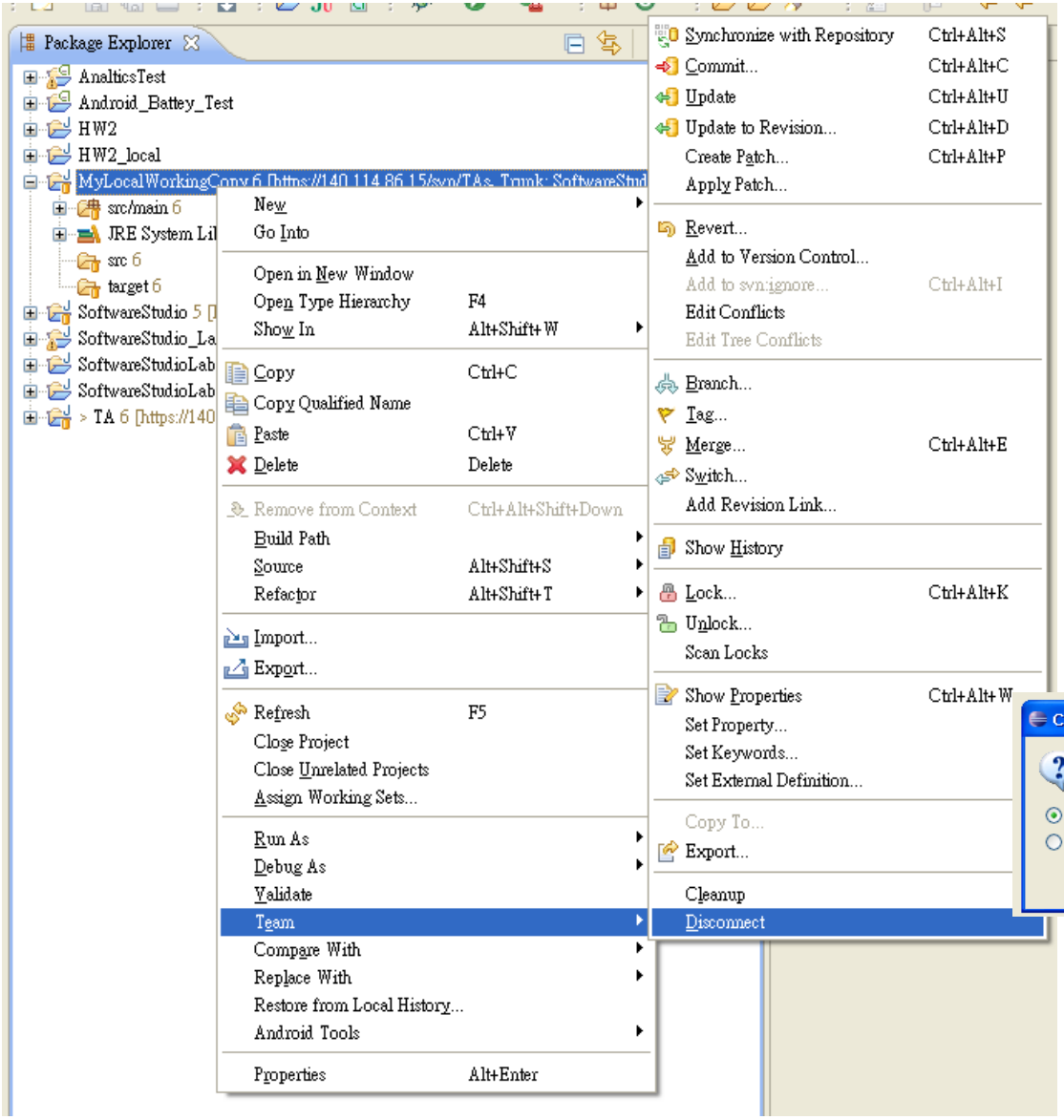
Outline

- Why do we need version control?
- Introduction to SVN
- Using SVN Client in Eclipse
- Exercise and Homework Submission

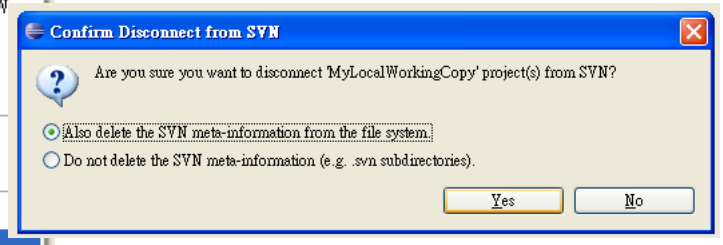
How to Submit Your Solutions to Assignments?

- Before the deadline, import your project into https://netdb.cs.nthu.edu.tw/svn/courses/software_studio/2013_fall/students/${your-student-id}/${proj-name}
  - E.g., https://netdb.cs.nthu.edu.tw/svn/courses/software_studio/2013_fall/students/9912345/geomap
- **Don't** modify the sample projects checked out from https://netdb.cs.nthu.edu.tw/svn/courses/software_studio/2013_fall/samples directly!
  - They are connected to sample projects on SVN
  - You need to break the connection first

Breaking Connections



- After breaking the connection, you have a "local" project
- Then modify this project, and import it to SVN as your solution



Authentication Required

- Account:
  - Your student ID
- Password:
  - Your student ID by default
  - Change it using this page: https://netdb.cs.nthu.edu.tw/svntools/passwd/index.php

A Note on Common Directory Structure

- In practice, many (open source) projects consist of the following 3 subdirectories:
  - trunk
    - Main line of development
    - Changing frequently
  - branches
    - Bug fixing
    - New features
    - Preparation of release
    - Should be merged back into trunk later
  - tags
    - Releases
    - Milestones of development
    - Making searches of older versions easier
- For simplicity, the projects we develop in this course contains only what resides in trunk

Lab: Java Debugging in Eclipse

NetDB

CS, NTHU,

Fall, 2013

Outline

- Overview
- Start a Debug Session
  - How To Start
  - Setting Breakpoints
  - Starting the Debugging
- Stack Frame
- Variables(inspect、watch)
- Exercise

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Overview

- How to use Eclipse Java debugger to look inside the Java running program?
- What is a debugger?
  - A tool which lets us pause a running program at any point to see the **contents of variables**.
- Debugger helps you…
  - Fix program mistakes(**semantic errors**).
  - Learn more about the inner working of Java.

Outline

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How To Start

- You need to follow two steps to start:
  1. Setting the **breakpoints**, which tell the debugger where to pause.
  2. Run the program in **debug mode**.

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- Exercise

Setting Breakpoints

- Right click in the small left column in your source code editor and select toggle breakpoint. Or you can double click on this place.

```
1  package netdb;
2
3  public class App {
4
5      public static void main(String... args) {
6              try {
7                  int g = 3;
8                  Mood m = new Mood(Mood.GOOD);
9                  Student s1 = new Student(g, m);
10                 System.out.println(s1.sayHello());
```

Double click

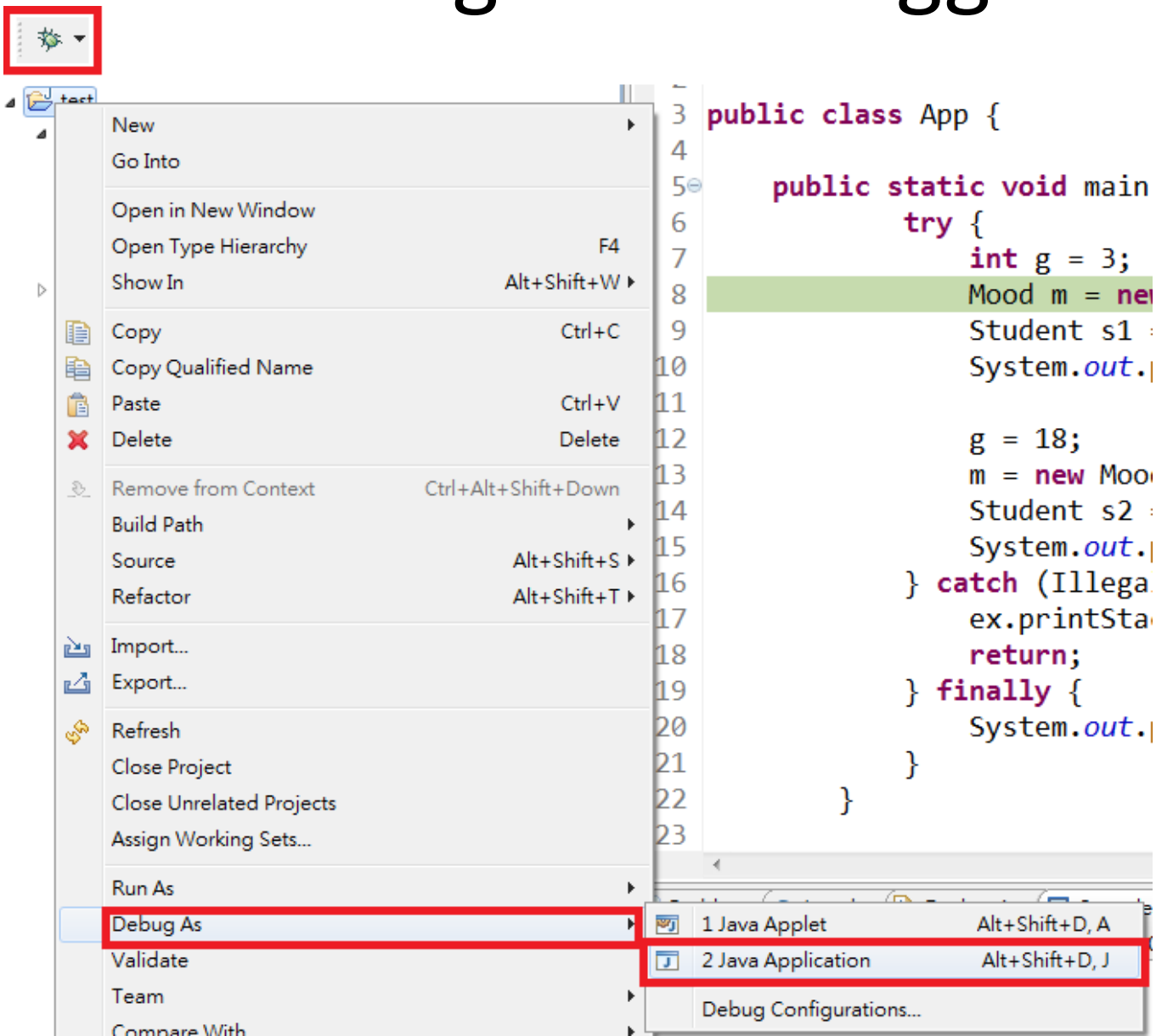
```
1  package netdb;
2
3  public class App {
4
5      public static void main(String... args) {
6              try {
7                  int g = 3;
                   Mood(Mood.GOOD);
                   = new Student(g, m);
                   println(s1.sayHello());

                   d(Mood.BAD);
                   = new Student(g, m);
                   println(s1.sayHello(s2));
                   lArgumentException ex) {
                   ckTrace();

                   println("main() executed");
```

- Toggle Breakpoint
- Disable Breakpoint
- Go to Annotation Ctrl+1
- Add Bookmark...
- Add Task...
- ✓ Show Quick Diff Ctrl+Shift+Q
- ✓ Show Line Numbers
- Folding
- Preferences...
- Breakpoint Properties...

Setting Breakpoints

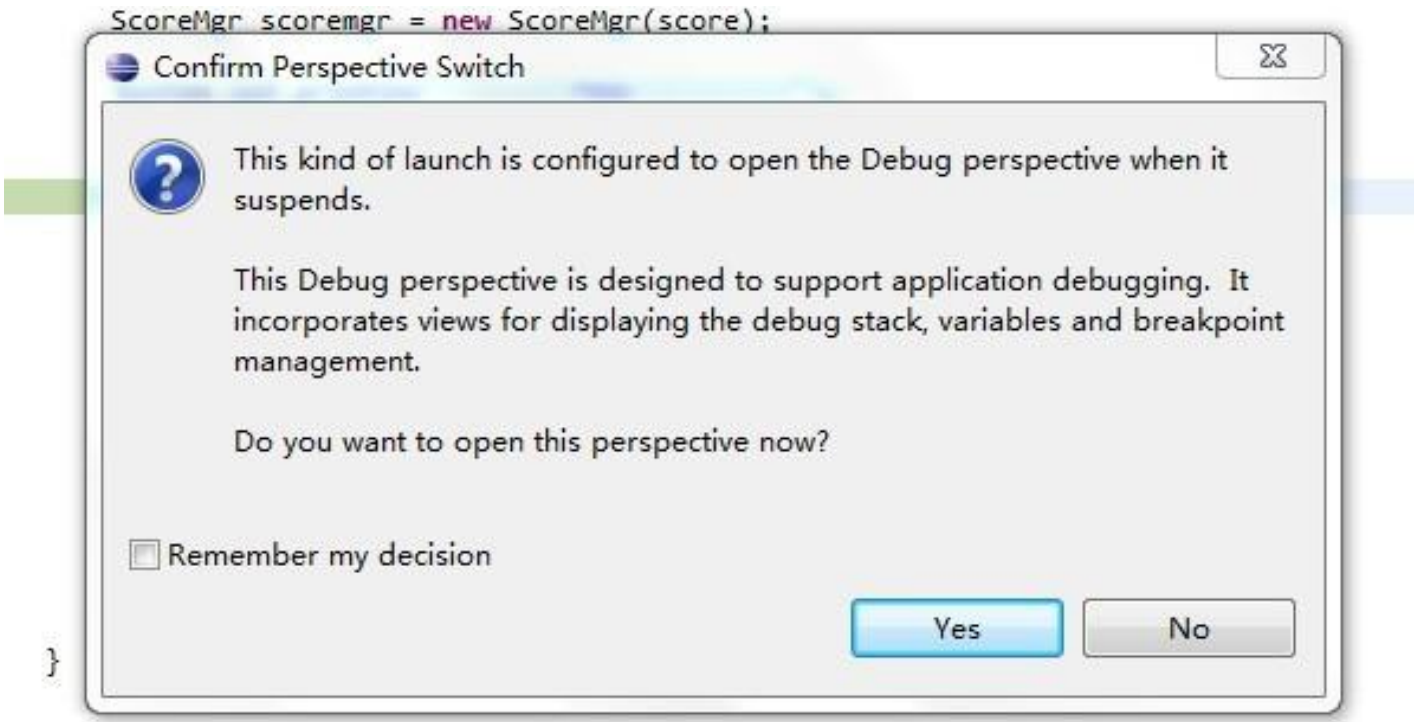
- You should set at least one breakpoint before starting debugging.
- If you have not defined any breakpoints, it will run your program as normal. To debug the program you need to define breakpoints.

Starting the Debugger



Debug Perspective

- Starting the debugger the first time, Eclipse will asked you if you want to switch to the debug perspective. Answer "yes".



Debug Perspective

- And you will switch to the debug mode.

Debug - test/src/netdb/App.java - Eclipse

File Edit Run Source Refactor Navigate Search Project Window Help

Debug | Java

Debug

App (2) [Java Application]
netdb.App at localhost:61316
Thread [main] (Suspended (breakpoint at line 9 in App))
App.main(String...) line: 9
C:\Program Files\Java\jdk1.6.0_27\jre\bin\javaw.exe (2011/9/30 下午4:10:38)

Variables | Breakpoints

Name	Value
args	String[0
g	3

Mood.java | Student.java | App.java

```
4
5    public static void main(String... args) {
6            try {
7                int g = 3;
8                Mood m = new Mood(Mood.GOOD);
9                Student s1 = new Student(g, m);
10               System.out.println(s1.sayHello());
11
12               g = 2;
13               m = new Mood(Mood.BAD);
14               Student s2 = new Student(g, m);
15               System.out.println(s1.sayHello(s2));
16           } catch (IllegalArgumentException ex) {
```

Outline

netdb
App
main(String...) : void

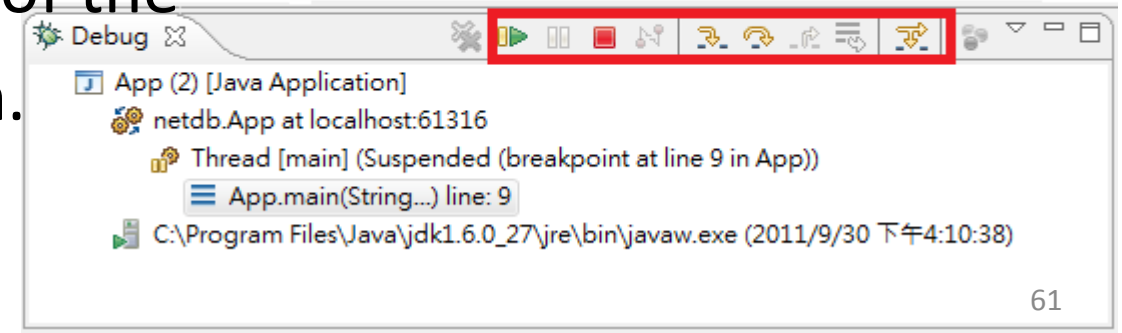
Console | Tasks

App (2) [Java Application] C:\Program Files\Java\jdk1.6.0_27\jre\bin\javaw.exe (2011/9/30 下午4:10:38)

Writable | Smart Insert | 9 : 1

Step Through the Code

- F5: Step Into
  - If the next step is a method / function this command will jump into the associated code.
- F6: Step Over
  - without entering the associated code.
- F7: Step Return
  - go to the caller of the method/ function.

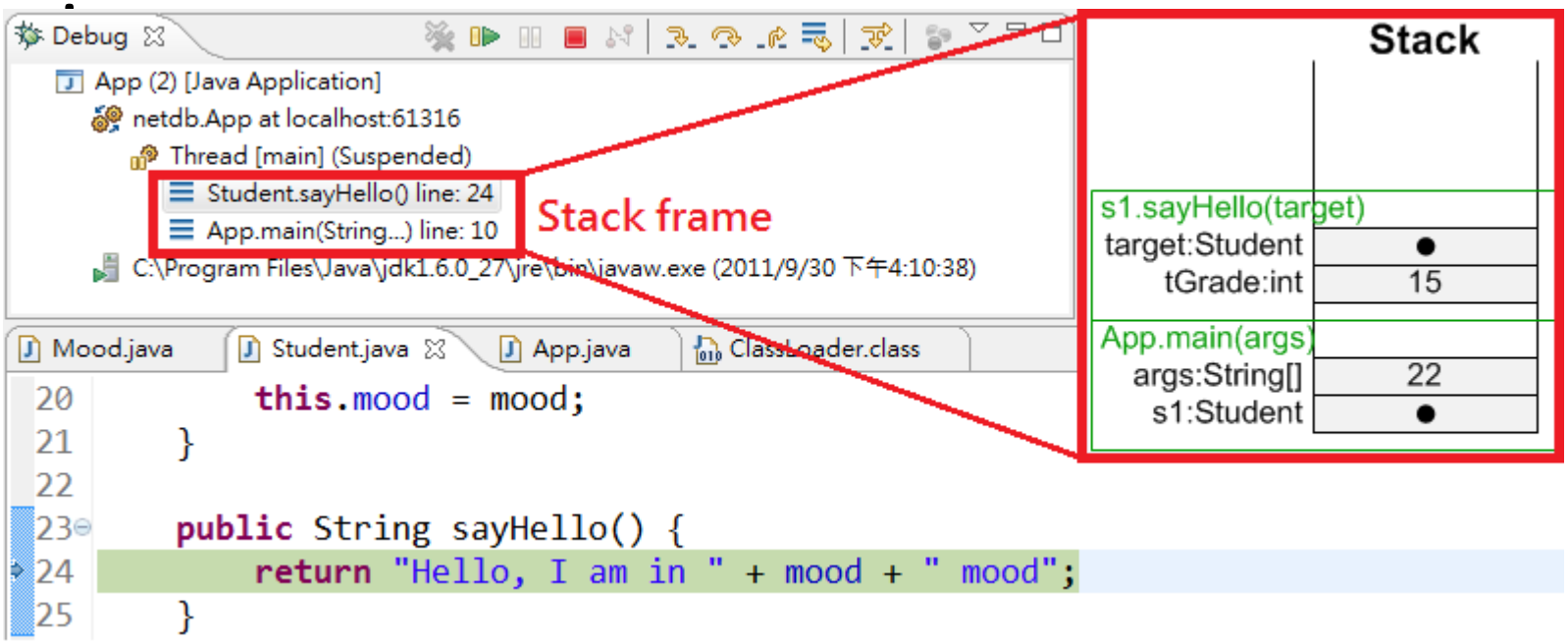


Outline

- Overview
- Start a Debug Session
  - How To Start
  - Setting Breakpoints
  - Starting the Debugging
- Stack Frame
- Variables(inspect、watch)
- Exercise

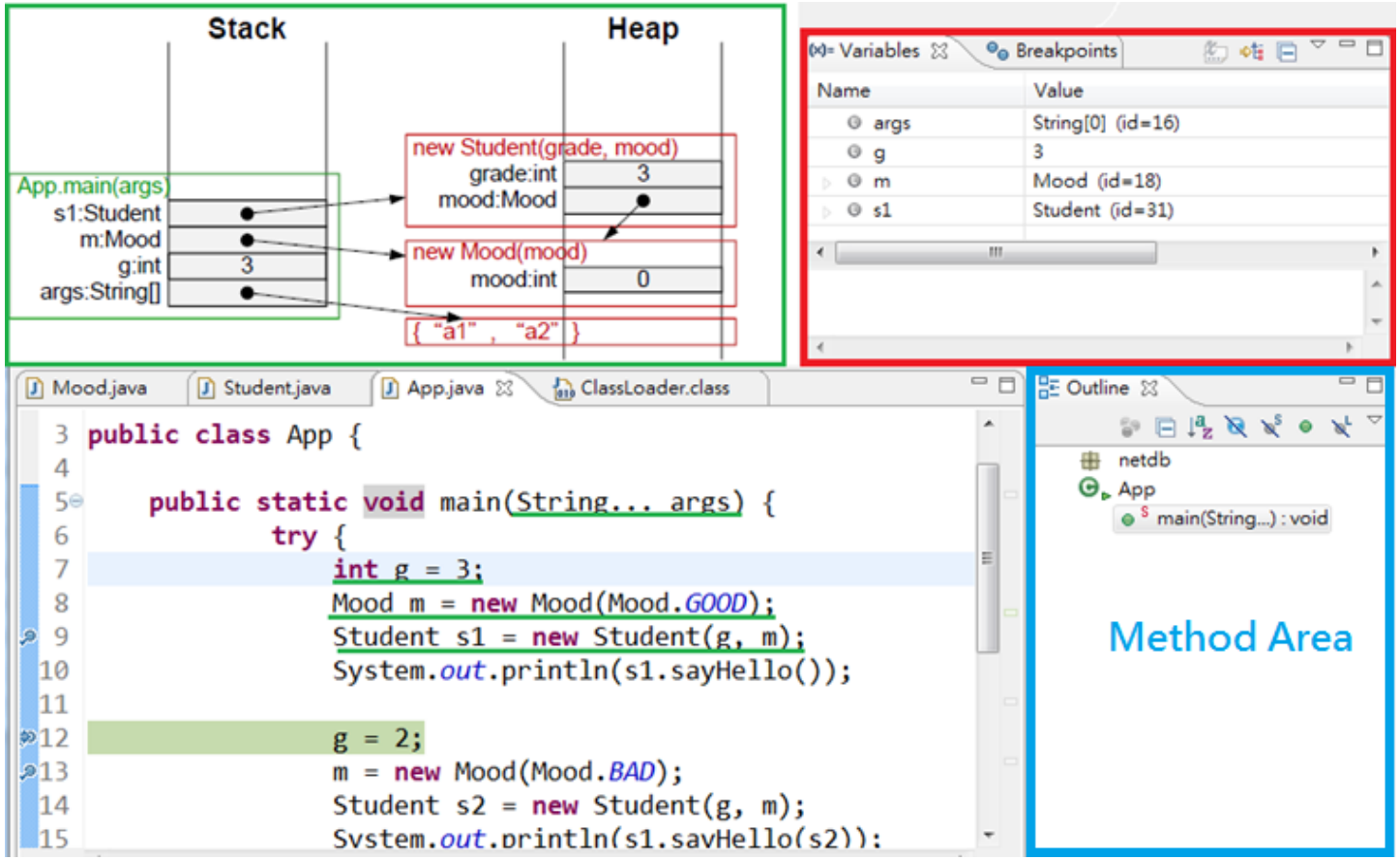
Stack Frame

- The current stack is displayed in the "Debug"



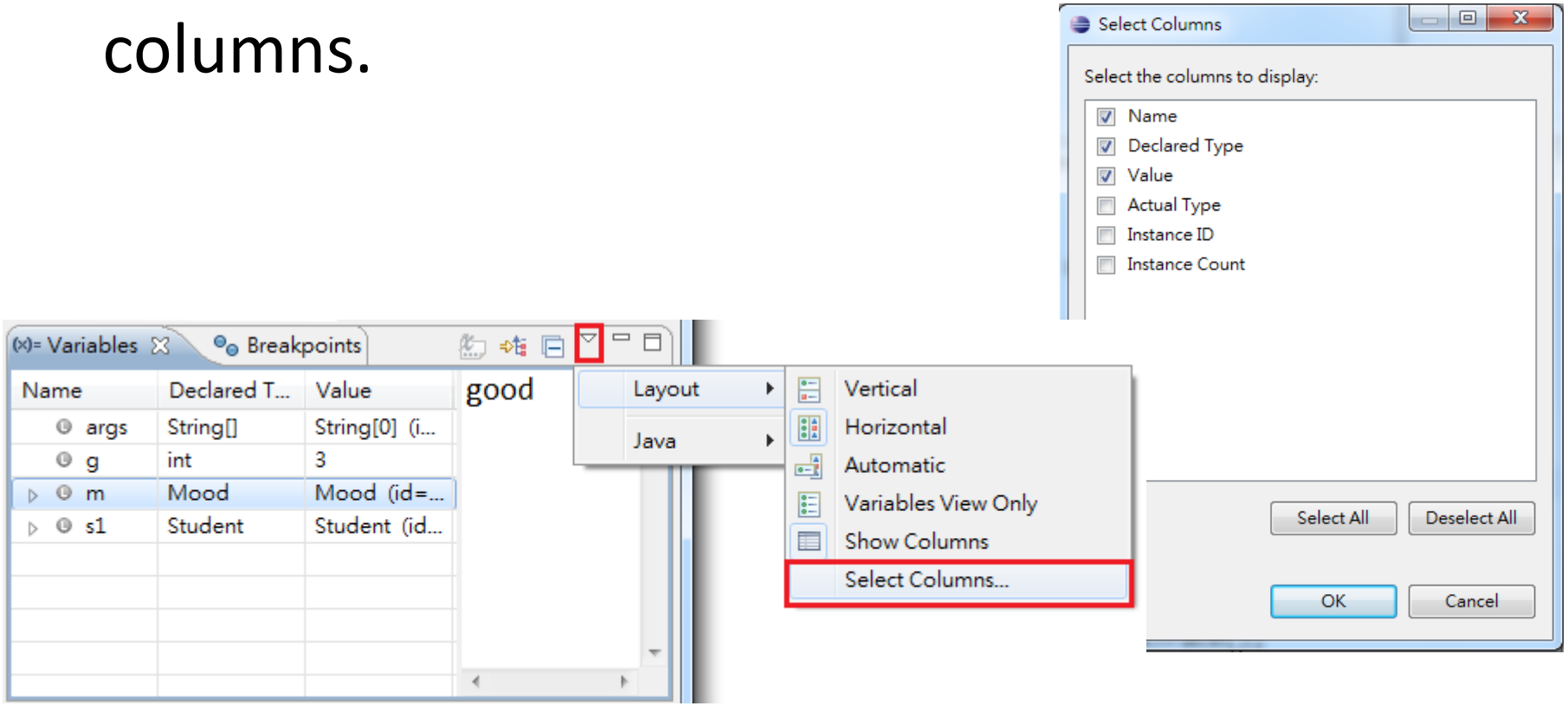
Variables (1/2)

- The view "Variables" displays fields and local variables from the current stack.



Variables (2/2)

- Via the menu you can change the variables layout and also customize the displayed columns.



Inspect

```
57
58    public void printScoreList() {
59        for (int i = 0; i < getEnrollStuc
60            System.out.println(scoreList[
61    }
62
63    private void swap(int i, int j) {
64        double tmp;
65        tmp = scoreList[i];
66        scoreList[i] = scoreList[j];
67        scoreList[j] = tmp;
68    }
69
```

- References
- Declarations
- Add to Snippets...
- Step Into Selection — Ctrl+F5
- All Instances... — Ctrl+Shift+N
- Instance Count...
- Force Return — Alt+Shift+F
- Watch
- Inspect — Ctrl+Shift+I
- Display — Ctrl+Shift+D
- Execute — Ctrl+U
- Run to Line — Ctrl+R
- Run As

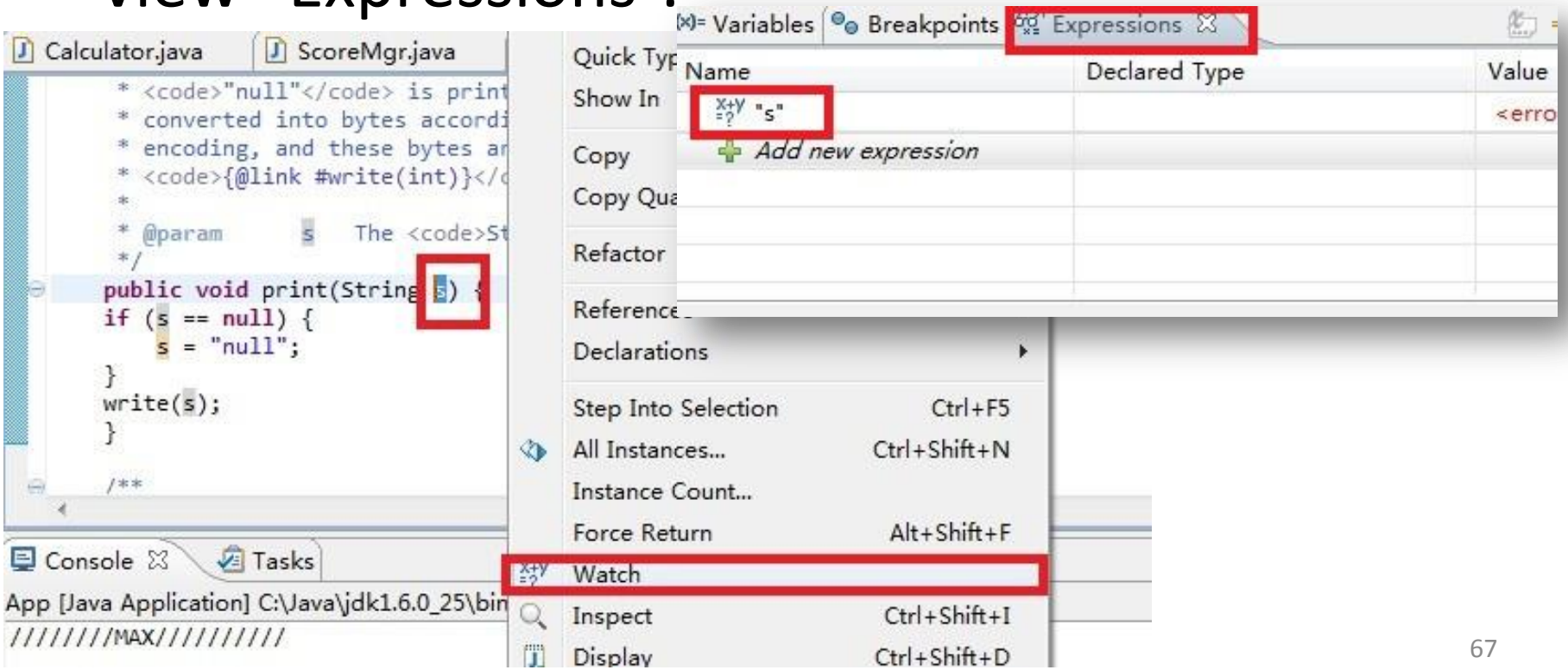
```
System.out.println(scoreList[i]);

te void swap(int i, in
ouble tmp;
mp = scoreList[i];
coreList[i] = scoreLis
coreList[j] = tmp;
```

scoreList= (id=22)
- [0]= 96.9
- [1]= 65.5
- [2]= 77.8
- [3]= 63.6

[96.9, 65.5, 77.8, 63.6]

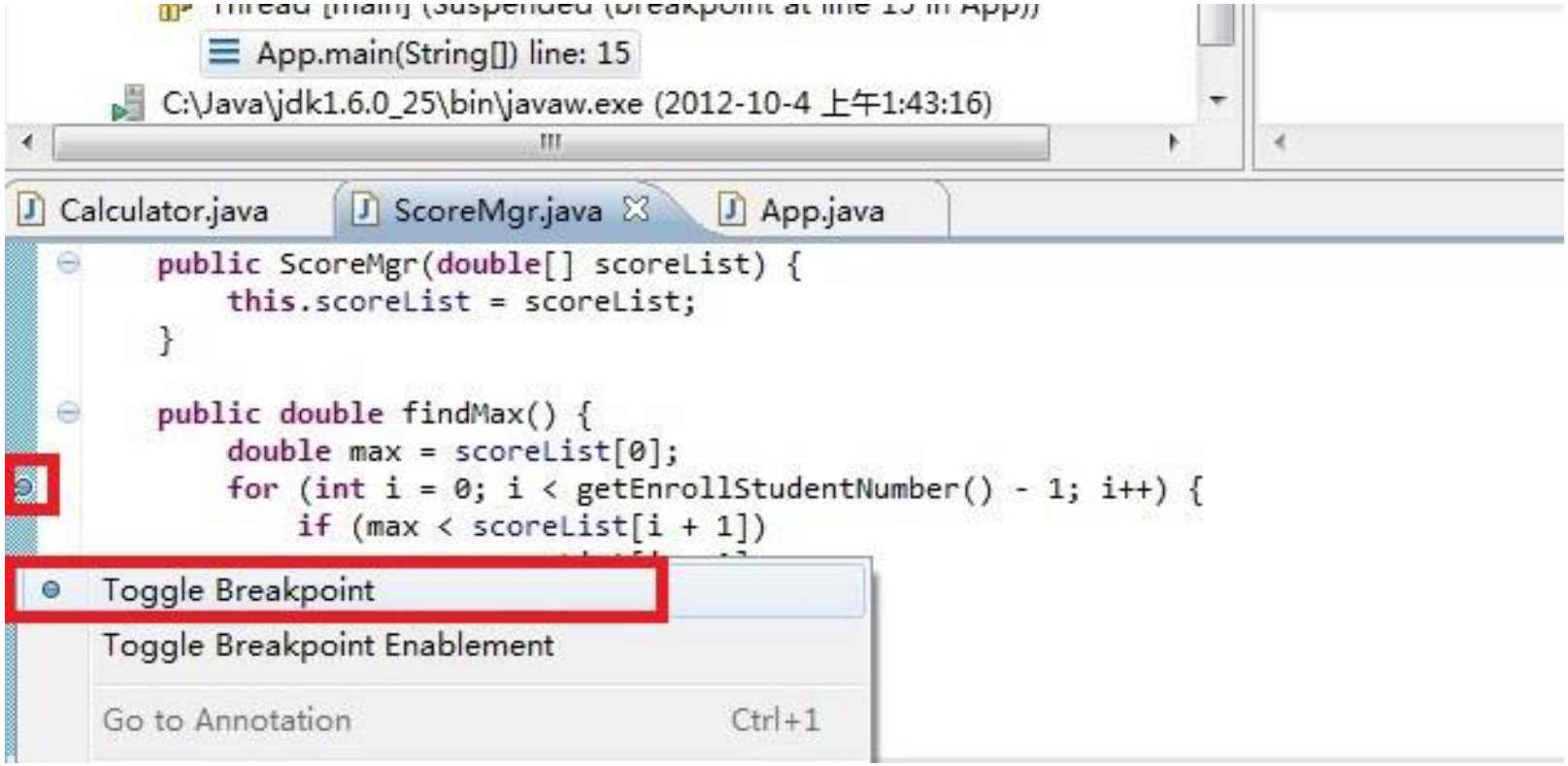
Watch

- You can add variables to watch and watch them all through the debug process in the view “Expressions”.



Tips

- You can add and remove breakpoints in debug mode by the same way.



Reference

- http://www.vogella.de/articles/EclipseDebugging/article.html

Outline

- Overview
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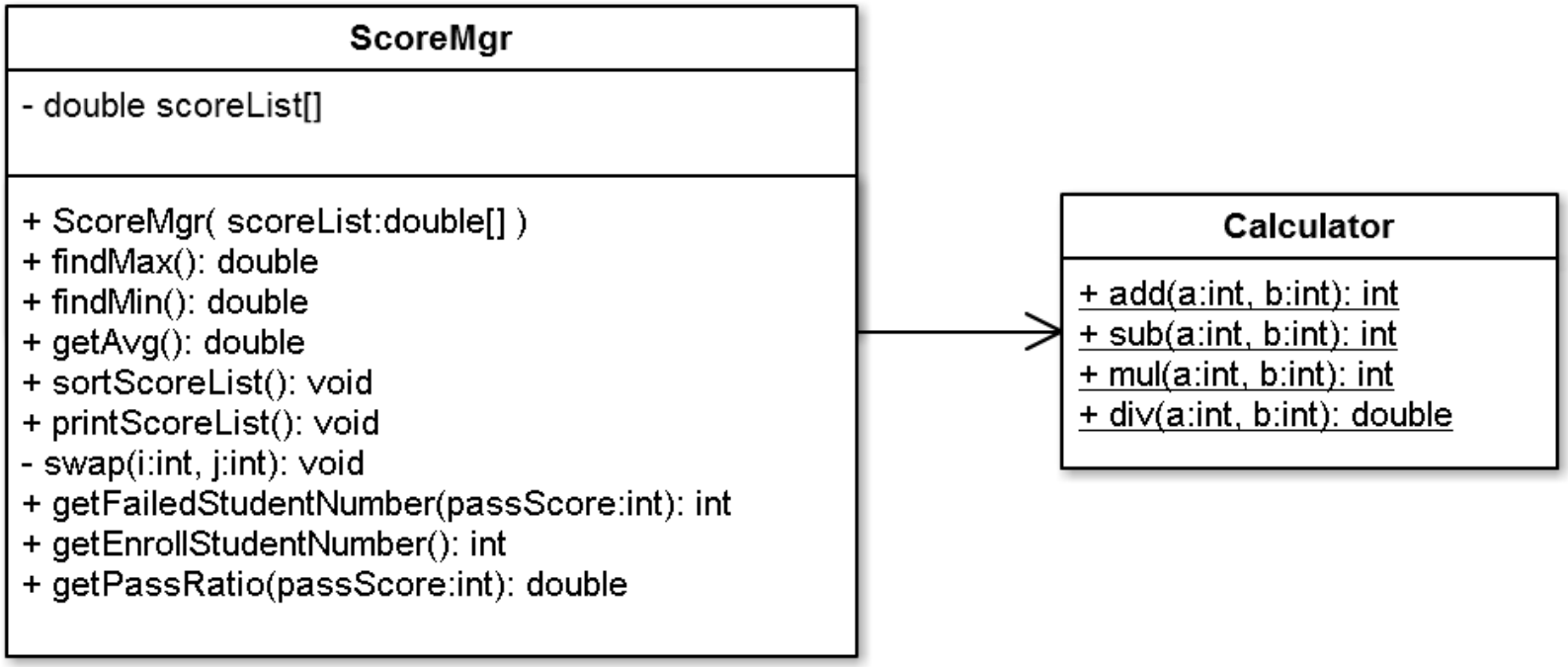
Exercise (1/4)

- Debug the *ScoreMgr.class* and *Calculator.class*.



Exercise (2/4)

```
public class App {
  public static void main(String[] args) {
    double score[]={96.9, 25.59, 75.6, 69.9, 65, 85.75, 88};
     ScoreMgr scoremgr = new ScoreMgr(score);

     System.out.println("////////MAX/////////");
     System.out.println(scoremgr.findMax());
     System.out.println("////////MIN/////////");
     System.out.println(scoremgr.findMin());
     System.out.println("////////AVG/////////");
     System.out.println(scoremgr.getAvg());
     System.out.println("///FailedStudent#////");
    System.out.println(scoremgr.getFailedStudentNumber(75));
     System.out.println("/////PassRatio//////");
     System.out.println(scoremgr.getPassRatio(75));
     System.out.println("//////UnSortList//////");
     scoremgr.printScoreList();
     System.out.println("//////SortedList//////");
     scoremgr.sortScoreList();
     scoremgr.printScoreList();

  }
}
```

```
////////MAX/////////
96.9
////////MIN/////////
25.59
////////AVG/////////
72.39142857142858
///FailedStudent#////
3
/////PassRatio//////
0.5714285714285714
//////UnSortList//////
96.9 25.59 75.6 69.9
65.0 85.75 88.0
//////SortedList//////
96.9 88.0 85.75 75.6
69.9 65.0 25.59
```

Exercise (3/4)

- There are 4 bugs in this project.
- Use debugger to help you find out all of them and correct it!

Exercise (4/4)

- Checkout BuggyScorer project here on the SVN: (p.18)
  - https://netdb.cs.nthu.edu.tw/svn/courses/software_studio/2013_fall/samples/buggyscorer
- Disconnect the project (p.46)
- Import the project to your SVN account (p.24)
- Correct all the bugs and commit the project (p.22)
- Please show TAs the places you've corrected and the final result of your project.