

Software Testing: Tutorial 7

Integration Testing

In this tutorial you will continue to develop the integration testing of the two code fragments we considered in lectures.

- **Prerequisites:** Review the material on Integration testing in Lecture 10 and the papers by Offutt et al on coupling-based coverage included in the schedule.
- **Preparation:** Review the code attached to this sheet; please try to understand the context of this code. If necessary have a look at the relevant modules in the Vmap system. The intention today is to develop and assess test suites that aim to test the interaction between these two methods. In a real-world situation we would be interested in the integration of the code in the Vmap module with its supporting environment. Considering how to test this would take longer than we have available in a one hour tutorial.

Activities

Depending on the size of the tutorial group split into two or three groups.

1. (10 Minutes) In your groups, do the following:
 - (a) Identify all the coupling paths between these code fragments.
 - (b) As part of this, identify the last defs and first uses on each path.
 - (c) Consider whether all the possible paths can actually occur in the course of some execution of the code. Identify any paths that are impossible.
2. (5 Minutes) Swap your list of paths with your neighbours and check that they agree with your list of paths. Reach an agreed list of paths.
3. (15 Minutes) Each of the groups should deal with one of the following coupling-based coverage criteria. You should then generate a test suite specification that ensures the coverage criterion is met.

[Notice that here a test suite specification might be easier to consider than a test suite because you will just require to specify some conditions on the url you are considering and the results of checks on the environment.]

 - (a) all-coupling-defs
 - (b) all-coupling-uses
 - (c) all-coupling-paths
4. (10 Minutes) Rotate the test set specifications round the groups and check to see it meets the required coverage criterion. If you find errors try to repair them.
5. (Remaining Time) Investigate the relationship between the different coverage criteria. Can you find a test suite which meets one of the criteria and fails to meet another? Do any of the coverage criteria subsume any other criteria?

```

===== Extract from Tools Class =====
public static String urlGetFile(URL url) {
    String osNameStart = System.getProperty("os.name").substring(0, 3);
    String fileSeparator = System.getProperty("file.separator");

    if(osNameStart.equals("Win") && url.getProtocol().equals("file")) {
        String fileName = url.toString().replaceFirst("^file:", "").
            replace('/', '\\');
        return (fileName.indexOf(':') >= 0) ?
            fileName.replaceFirst("^\\\\\\\\" + "*", "") :
            fileName; // Network path
    } else {
        return url.getFile();
    }
}
}

```

```

===== Extract from Vmap Class =====
public void openDocument(URL url) throws Exception {
    String osName = System.getProperty("os.name");
    if(osName.substring(0, 3).equals("Win")) {
        String propertyString = new String(
            "default_browser_command_windows");
        if(osName.indexOf("9") != -1 || osName.indexOf("Me") != -1) {
            propertyString += "_9x";
        } else {
            propertyString += "_nt";
        }
    }

    String browser_command = new String();
    String command = new String();
    try {
        Object[] messageArguments = { url.toString() };
        MessageFormat formatter = new MessageFormat(
            getProperty(propertyString));
        browser_command = formatter.format(messageArguments);

        if(url.getProtocol().equals("file")) {
            command = "rundll32 url.dll,FileProtocolHandler " +
                Tools.urlGetFile(url);
        } else if(url.toString().startsWith("mailto:")) {
            command = "rundll32 url.dll,FileProtocolHandler " +
                url.toString();
        } else {
            command = browser_command;
        }
    }
    ...
}

```