Ankh Test Report

Preface

This report describes the testing of Ankh. Ankh is a Visual Studio .NET addin for the Subversion revision control system. An addin is a software component that makes it possible to addfunctionality into an already existing product. The development of Ankh was conducted as a final year project at HiO in cooperation with CollabNet.

This report is intended for computer personnel responsible for maintenance, updating, support and modifications of the system. The purpose of this document is to give a description of how the system is tested.

It is advantageous to have knowledge of revision control systems and VS.NET to best understand this document. A dictionary containing the terminology used is enclosed in the appendix. Screenshots of Ankh are enclosed in the appendix. This part is included to make it possible to read this report independently from the process and product documentation.

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1 Testing Goals

A major goal in this project was to create an aggressive automated test suite that would insure that Ankh was thoroughly tested for weaknesses at every stage of development. We started out writing unit tests for small discrete portions of the program and then in later stages we combined parts of the program gradually, finally testing the discrete parts as well as the integration of all components in the end.

With the help of the automated testing product Nunit , and the continuous builds generated using the automated building tool Nant we had an important safeguard against regression flaws - build and execution errors became quickly apparent to all members of the team   Functional integrity was also tested by the development team which used Ankh while developing Ankh. We also made both binary and source releases of Ankh available at http://ankhsvn.tigris.org, and we have received ots of valuable feedback from users in this way. Early paper prototype testing of the GUI confirmed that our navigational model was logical and intuitive. The final set of all tests created is described in this report.

2   Continuous NUnit testing through development

NUnit is a free open source unit-testing framework for all .NET languages. NUnit was originally ported from JUnit which is a unit-testing tool for Java. We used version 2.0 during the testing of Ankh. NUnit is coded in C# . An example of a unit-test is shown below. The test verifies the implementation of the Add method in the lower wrapper layer of Ankh. The Add method adds an unversioned file to revision control. An unversioned file is a file that is not under revision control. Revision control is described in the product and process report.

```csharp
namespace NSvn.Core.Tests
{
    /// <summary>
    /// Tests NSvn::Core::Client::Add
    /// </summary>
    [TestFixture]
    public class AddTest : TestBase
    {
        [SetUp]
        public override void SetUp()
        {
            this.ExtractWorkingCopy();
            this.notifications = new ArrayList();
        }

        /// <summary>
```

```
/// Attempts to add a file, checking that the file actually was
/// added
/// </summary>
  [Test]
  public void TestBasic()
  {
     string testFile = this.CreateTextFile( "testfile.txt" );

     ClientContext ctx = new ClientContext( new NotifyCallback() );
     Client.Add( testFile, false, ctx );

     Assertion.Assert( "No notification callbacks received",
                    this.Notifications.Length > 0 );

     Assertion.AssertEquals( "svn st does not report the file as added",
                    'A', this.GetSvnStatus( testFile ) );


  }

}
```
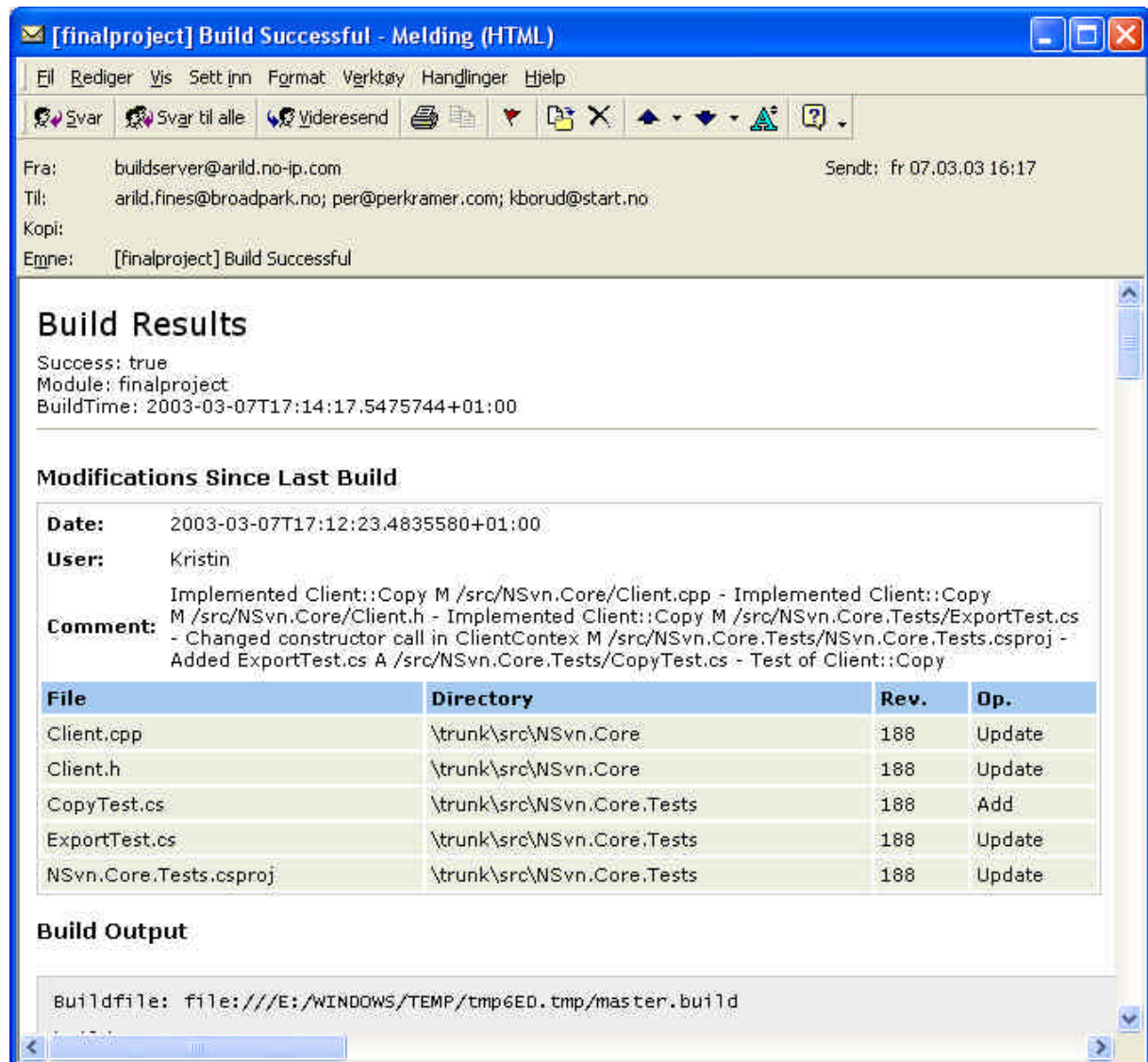
In the Setup() method a working copy is extracted. A working copy is a collection of files and folders under revision control. To be able to add an unversioned file to revision control a working copy is required. An ArrayList is initialised. This list will contain feedback from the Subversion API after Client.Add(..) has added the unversioned file to revision control.

In the TestBasic() method an unversioned file "testfile.txt" is created. The input parameter "false" in Client.Add(...) indicates that Add is performed on only one file, not recursively. Client.Add(..) is run with required input parameters and should add an unversioned file to the extracted working copy. Assertion.Assert(....) checks whether there has been any feedback from Subversion (SVN) after the add was performed. If this.Notifications.Length is less than 1 (no notifications received at all) the test will fail and "No notification callbacks received" will be displayed in the NUnit display.   If this.Notifications.Length is more than 0 the test will succeed. Assertion.AssertEquals(...) checks if the status on the file has changed to "A" by invoking the command line client. If the status is not "A" the test will fail and "svn st does not report the file as added" will be displayed by NUnit. If the status is "A" the test will succeed.

3 Independent NAnt build

Independent NAnt builds of Ankh were done continuously during development to ensure sanity and quality of the addin/wrapper. At regular intervals NAnt checked out a fresh working copy, built the project and all unit tests were run. A build e-mail describing whether the build failed or succeeded was sent to all group members after every build. An example of a build e-mail is shown below.

4 Paper prototype testing

To test the GUI design a paper prototype test was devised to check whether our navigation model, as well as our choice of names for buttons, menus and text fields etc. were logical and intuitive.

The paper prototype test was performed on three test subjects, each with some programming experience. One of the individuals was familiar with revision control systems and VS.NET. Before the tests were performed the participants were given a short introduction to revision control and VS.NET. Three scenarios were selected covering integration of commit, log and edit properties. The overall conclusion from these tests was that for the most part our navigation model was intuitive as well as logical but that it could be improved. Based on the feedback we modified the names of button and text fields in dialog boxes, and the placement of buttons, text fields, combo boxes etc. A need for integrated help was also identified.

5   Functional testing

During the Alpha testing we published both binary and source versions of Ankh at http://ankhsvn.tigris.org. This allowed users to choose whether to build Ankh from source or install it from a Windows Installer package.
Since we wanted to know when Ankh failed in some way, we embedded an error reporting mechanism into it. When an unhandled exception was thrown by Ankh or NSvn the user was asked whether he wanted to submit an error report. If the user agreed a web browser would open and the user was sent to a web form. The error message would be automatically filled in, including the stack trace and version number. The user could also choose to fill in a separate comment and/or his email address. The Ankh error report page is shown below.
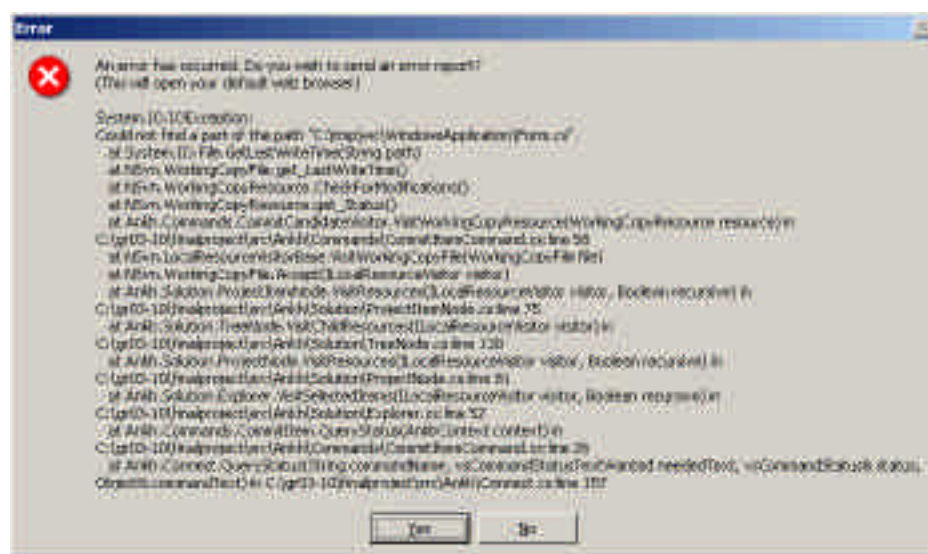
Error report page

Error message:

```
NSvn.Core.SvnClientException:
svn client error: failed to add file 'C:/tmp/wc-
5/WindowsApplication/Class2.cs': object of the same name already exists
at n:\subversion\subversion\libsvn_wc\update_editor.c : line 1088
    at NSvn.Core.HandleError(svn_error* err)
    at NSvn.Core.Client.Update(String path, Revision revision, Boolean recurse,
ClientContext context)
    at NSvn.WorkingCopyResource.Update(Revision revision, Boolean recursive)
    at NSvn.WorkingCopyResource.Update()
    at Ankh.Commands.UpdateVisitor.Update() in T:\moo\Ankh-
Release\Ankh\Commands\UpdateItemCommand.cs:line 57
    at Ankh.Commands.UpdateItem.Execute(AnkhContext context) in T:\moo\Ankh-
Release\Ankh\Commands\UpdateItemCommand.cs:line 43
    at Ankh.Connect.Exec(String commandName, vsCommandExecOption executeOption,
Object& varIn, Object& varOut, Boolean& handled) in T:\moo\Ankh-
Release\Ankh\Connect.cs:line 206
```

Additional comments:

```
Tried to commit already committed item
```

Your email adress (Optional):

Version: 0.1.0.571

[Send]

The submitted report is sent to a private mailing list that all the group members are subscribed to. Details from the exception stack trace give useful information about issues that must be resolved. (see issue tracker at http://ankhsvn.tigris.org). The issue tracker documents existing weaknesses and possible future improvements to Ankh. The issue list shows type of feature, priority, status, result and summary of the issues. This database helps us to remember things we plan to implement in later versions and makes it easy to see the status on issues to be solved in near future. The Revert dialog was implemented by user request from this testing phase. Ankh's revert dialog is enclosed in the environment image collection.

 It was not possible to use Ankh until the most basic SVN commands, including add, update, commit and status, were implemented. . As soon as it was usable Ankh was regularly used in the development process, providing a unique opportunity for testing. The picture below shows the Ankh project with a new instance of VS.NET above. The new instance was started from the Ankh project. This made it possible to continuously work with the last update of Ankh and testing it at the same time with real data.
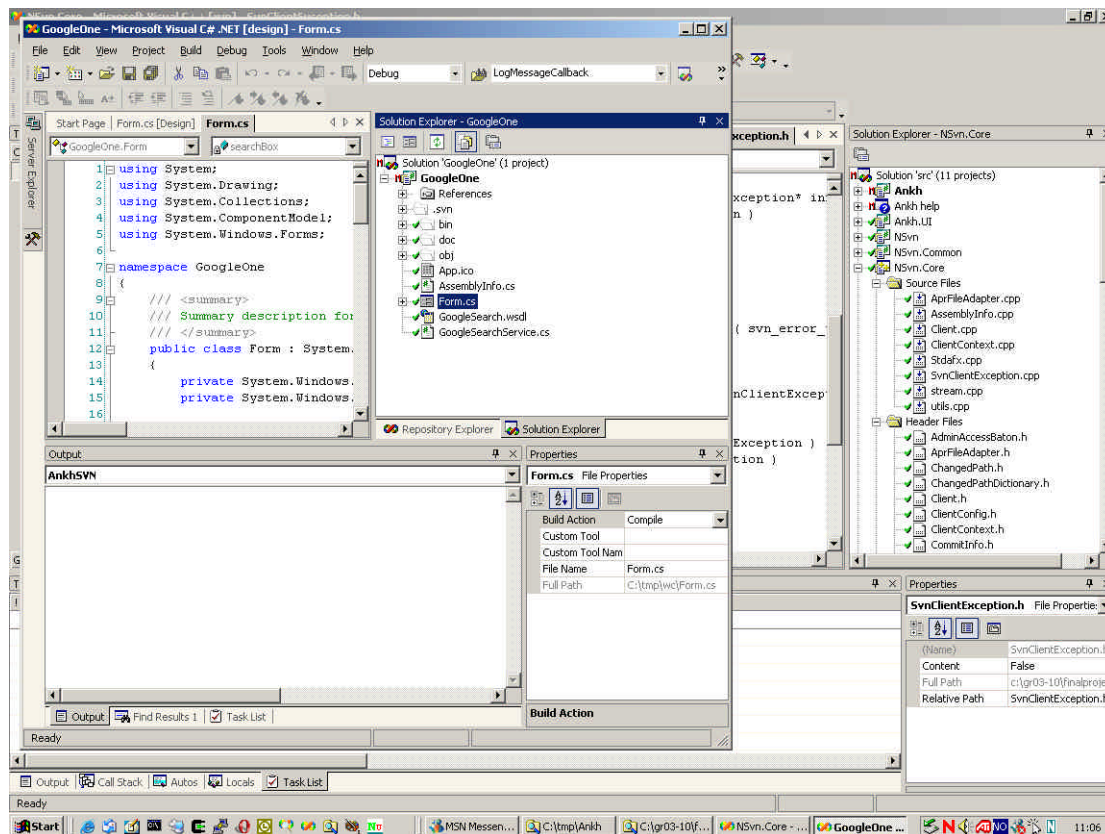
Ankh was tested on the intended audience in Ankh Alpha1-release. AnkhSetup.msi was made available for installation from http://ankhsvn.tigris.org. The installer included a test repository that is optionally extracted to the computers local hard drive during installation.

Ankh supports mainly Visual Basic (VB), Visual C# (VC#) and Visual C++ (VC++) projects. Support for VC++ projects is weaker than VC# and VB projects, this because the VS automation model is different for VC++ projects. Ankh Alpha 0.1 was tested functionally with a number of tests described in the following sub chapters.

5.1 Testing of status icons in Solution Explorer

Solution Explorer display files, folders, projects and the solution (item) with updated Ankh status icons. Tests performed to verify Ankh status icons displayed in Solution Explorer are listed in the table below. An image of Solution Explorer is enclosed in the appendix.

Test	Result /Comment	Date
Status icon is shown in Solution Explorer in front of an unversioned file.	Ok if VB files are within versioned projects.	19.05.2003
Status icon is shown in Solution Explorer in front of an unversioned file.	Ok if VC++ files are within versioned projects.	19.05.2003
Status icon is shown in Solution Explorer in front of an unversioned file.	Ok if VC# files are within versioned projects.	19.05.2003
Status icon is shown in Solution Explorer in front of an unversioned directory.	Ok if VB folders are within versioned projects.	19.05.2003
Status icon is shown in Solution Explorer in front of an unversioned directory.	Not visible for C++ folders.	19.05.2003
Status icon is shown in Solution Explorer in front of an unversioned directory.	Ok if VC# folders are within versioned projects.	19.05.2003
Status icon is shown in Solution Explorer in front of an unversioned project.	Icons not visible on VC# projects	19.05.2003
Status icon is shown in Solution Explorer in front of an unversioned project	Icons not visible on VC++ projects.	19.05.2003
Status icon is shown in Solution Explorer in front of an unversioned project	Icons not visible on VB projects.	19.05.2003
Status icon is shown in Solution Explorer in front of a versioned file	Ok	19.05.2003
Status icon is shown in Solution Explorer in front of a versioned folder	Ok	19.05.2003
Status icon is shown in Solution Explorer in front of a versioned project	Ok	19.05.2003

Test	Result /Comment	Date
✔ Status icon is shown in Solution Explorer in front of a versioned solution	Ok	19.05.2003
Status icon is shown in Solution Explorer in front of a modified, saved, versioned file	Ok the status is shown if the modified file is saved	19.05.2003
Status icon is shown in Solution Explorer in front of a modified, saved, versioned folder	Ok the status is shown if the modified folder is saved	19.05.2003
Status icon is shown in Solution Explorer in front of a modified, saved, versioned project	Ok the status is shown if the modified project is saved.	19.05.2003
Status icon is shown in Solution Explorer in front of a modified, saved, versioned solution	Ok the status is shown if the modified solution is saved.	19.05.2003
Status icon is shown in Solution Explorer in front of an added, versioned file.	Ok, visible for VB files.	19.05.2003
Status icon is shown in Solution Explorer in front of an added, versioned file.	Ok, visible for VC# files.	19.05.2003
Status icon is shown in Solution Explorer in front of an added, versioned file.	Ok, visible for VC++ files.	19.05.2003
Status icon is shown in Solution Explorer in front of an added, versioned folder	Ok for VB folders.	19.05.2003
Status icon is shown in Solution Explorer in front of an added, versioned folder	Ok for C# folders.	19.05.2003
Status icon is shown in Solution Explorer in front of an added, versioned folder.	Icons not visible for C++ folders.	19.05.2003
Status icon is shown in Solution Explorer in front of an added, versioned project.	Ok for VC++ projects.	19.05.2003
Status icon is shown in Solution Explorer in front of an added, versioned project.	Ok for VC#, projects.	19.05.2003
Status icon is shown in Solution Explorer in front of an added, versioned project.	Ok for VB projects.	19.05.2003
Status icon is shown in Solution Explorer in front of an added, versioned project.	Ok for Help projects.	19.05.2003

Test	Result /Comment	Date
! Status icon is shown in Solution Explorer in front of a conflicted, versioned file.	Ok.	19.05.2003
! Status icon is shown in Solution Explorer in front of a conflicted, versioned project	Ok.	19.05.2003
! Status icon is shown in Solution Explorer in front of a conflicted, versioned solution	Ok.	19.05.2003
Status icon is shown in Solution Explorer in front of a locked, versioned file	Not visible.	19.03.2003
Status icon is shown in Solution Explorer in front of a locked, versioned folder	Not visible.	19.03.2003
Status icon is shown in Solution Explorer in front of a locked, versioned project	Not visible.	19.03.2003
Status icon is shown in Solution Explorer in front of a locked, versioned project	Not visible.	19.03.2003

5.2 Testing of add in Solution Explorer

Tests performed to verify the *Add* item menu option in Solution Explorer are listed in the table below. The *Add* option adds an unversioned file to revision control. An image of the item menu is enclosed in the appendix.

Test	Result /Comment	Date
Add option is enabled in menu if unversioned VB file (status icon ?) is selected in Solution Explorer and right clicked.	Ok	19.05.2003
Add option is enabled in menu if unversioned VC# file (status icon ?) is selected in Solution Explorer and right clicked.	Ok	19.05.2003
Add option is enabled in menu if unversioned VC++ file (status icon ?) is selected in Solution Explorer and right clicked.	Ok	19.05.2003

Test	Result /Comment	Date
Add option is enabled in menu if unversioned Help file (status icon 🔑) is selected in Solution Explorer and right clicked.	Ok	19.05.2003
Add option is enabled in menu if unversioned VB folder (status icon 🔑) is selected in Solution Explorer and right clicked.	Ok for VB if folders are within a versioned project.	19.05.2003
Add option is enabled in menu if unversioned VC# folder (status icon 🔑) is selected in Solution Explorer and right clicked.	Ok for VC# if folders are within a versioned project.	19.05.2003
Add option is enabled in menu if unversioned VC++ folder (status icon 🔑) is selected in Solution Explorer and right clicked.	Not enabled for VC++ folders.	19.05.2003
Add option is enabled in menu if unversioned VB project (status icon 🔑) is selected in Solution Explorer and right clicked.	Ok	19.05.2003
Add option is enabled in menu if unversioned VC# project (status icon 🔑) is selected in Solution Explorer and right clicked.	Ok	19.05.2003
Add option is enabled in menu if unversioned VC++ project (status icon 🔑) is selected in Solution Explorer and right clicked.	Ok	19.05.2003
Add option is enabled in menu if unversioned Help project (status icon 🔑) is selected in Solution Explorer and right clicked.	Ok	19.05.2003
Add option is disabled in menu if versioned VC# file (status icon ✔) is selected in Solution Explorer and right clicked.	Ok	19.05.2003
Add option is disabled in menu if versioned VC# folder (status icon ✔) is selected in Solution Explorer and right clicked	Ok	19.05.2003

Test	Result /Comment	Date
Add option is disabled in menu if versioned VC# project (status icon) is selected in Solution Explorer and right clicked	Ok	19.05.2003
Add option is disabled in menu if versioned VC# solution (status icon) is selected in Solution Explorer and right clicked	Ok	19.05.2003
Add option is disabled in menu if modified, versioned VC# file (status icon) is selected in Solution Explorer and right clicked	Ok	19.05.2003
Add option is disabled in menu if modified, versioned VC# folder (status icon) is selected in Solution Explorer and right clicked	Ok	19.05.2003
Add option is disabled in menu if modified, versioned VC# project (status icon) is selected in Solution Explorer and right clicked	Ok	19.05.2003
Add option is disabled in menu if modified, versioned VC# solution (status icon) is selected in Solution Explorer and right clicked	Ok	19.05.2003
Add option is disabled in menu if added, versioned VB file (status icon) is selected in Solution Explorer and right clicked.	Ok	19.05.2003
Add option is disabled in menu if added, versioned VC# file (status icon) is selected in Solution Explorer and right clicked.	Ok	19.05.2003
Add option is disabled in menu if added, versioned VC++ file (status icon) is selected in Solution Explorer and right clicked.	Ok	19.05.2003
Add option is disabled in menu if added, versioned VB folder (status icon) is selected in Solution Explorer and right clicked	Ok	19.05.2003
Add option is disabled in menu if added, versioned VC# folder (status icon) is selected in Solution Explorer and right clicked	Ok	19.05.2003

Test	Result /Comment	Date
Add option is disabled in menu if added, versioned VC++ folder (status icon 🔷) is selected in Solution Explorer and right clicked	Ok	19.05.2003
Add option is disabled in menu if added, versioned VC# project (status icon 🔷) is selected in Solution Explorer and right clicked	Ok	19.05.2003
Add option is disabled in menu if added, versioned VC++ project (status icon 🔷) is selected in Solution Explorer and right clicked	Ok	19.05.2003
Add option is disabled in menu if added, versioned VB project (status icon 🔷) is selected in Solution Explorer and right clicked	Ok	19.05.2003
Add option is disabled in menu if conflicted, versioned file (status icon ❗) is selected in Solution Explorer and right clicked.	Ok	21.05.2003
Add option is disabled in menu if conflicted, versioned folder (status icon ❗) is selected in Solution Explorer and right clicked	Ok.	21.05.2003
Add option is disabled in menu if conflicted, versioned project (status icon ❗) is selected in Solution Explorer and right clicked	Ok.	21.05.2003
Add option is disabled in menu if locked, unversioned file is selected in Solution Explorer and right clicked	Ok, tested at VB files in locked, unversioned VB project.	19.05.2003
Add option is disabled in menu if locked, unversioned folder is selected in Solution Explorer and right clicked	Ok, tested at VB folder in locked, unversioned VB project.	19.05.2003
Add option is enabled in menu if locked, unversioned project is selected in Solution Explorer and right clicked.	Ok, tested at VB project in locked, unversioned VB project. .	19.05.2003
"Working copy locked" warning if **Add** option is selected from item menu for a locked, unversioned project	Ok, tested at VB project.	19.05.2003

Test	Result /Comment	Date
It is possible to add an unversioned VC# file (*.cs) to revision control	Ok	19.05.2003
It is possible to add an unversioned VC++ file (*.cpp) to revision control	Ok	19.05.2003
It is possible to add an unversioned VB file (*.vb) to revision control	Ok	19.05.2003
It is possible to add an unversioned folder to a versioned VC# project	Ok	19.05.2003
It is possible to add an unversioned folder to a versioned VB project	Ok	19.05.2003
It is possible to add an unversioned folder to a versioned Help project	Return error message	19.05.2003
It is possible to add an unversioned folder to a versioned Extensibility project	Ok, for the main part of the Extensibility project, not possible for the Setup part of the project.	19.05.2003
It is possible to add a VC# project to revision control	Ok	19.05.2003
It is possible to add a VC++ project to revision control	Ok	19.05.2003
It is possible to add a VB project to revision control	Ok	19.05.2003
It is possible to add a Help project to revision control	Ok	19.05.2003
It is possible to add a Extensibility project to revision control	Main part of VS.NET Add-in and Shared Add-in project added. Setup part of Extensibility project not added.	19.05.2003
Status icon is changed to ✿ in front of VC# file in Solution Explorer after unversioned file is added	Ok	19.05.2003
Status icon is changed to ✿ in front of file in Solution Explorer after unversioned file is added	Ok if Refresh was ran on VB and VC++ files	19.05.2003
Status icon is changed to ✿ in front of folder in Solution Explorer after unversioned folder is added	Ok for C# projects. Ok if Refresh was ran on VB folder. Icon not visible for added C++ Header and Source folders.	19.05.2003
Status icon is changed to ✿ in front of project in Solution Explorer after unversioned VB project is added	Ok	19.05.2003
Status icon is changed to ✿ in front of project in Solution Explorer after unversioned VC# project is added	Ok	19.05.2003
Status icon is changed to ✿ in front of project in Solution Explorer after unversioned VC++ project is added	Ok	19.05.2003

Test	Result /Comment	Date
Status icon is changed to ✦ in front of project in Solution Explorer after unversioned project is added	Ok for Help projects	19.05.2003
Status icon is changed to ✦ in front of project in Solution Explorer after unversioned project is added	Ok for Main part of Extensibility projects (not Setup part)	19.05.2003
Add works recursively on files in C++ folder	Ok, tested on folders containing C++ Header and Source files.	19.05.2003
Add works on several VB files	Ok	20.05.2003
Add works on several VC# files	Ok	20.05.2003

5.3 Testing of update in Solution Explorer

Tests performed to verify the *Update* item menu option in Solution Explorer are listed in the table below. The *Update* option updates a versioned file to include last committed changes.

Test	Result /Comment	Date
Update option is disabled in menu if unversioned VB file (status icon ❗) is selected in Solution Explorer and right clicked	Ok	20.05.2003
Update option is disabled in menu if unversioned VC# file (status icon ❗) is selected in Solution Explorer and right clicked	Ok	20.05.2003
Update option is disabled in menu if unversioned VC++ file (status icon ❗) is selected in Solution Explorer and right clicked	Ok	20.05.2003
Update option is disabled in menu if unversioned VB folder (status icon ❗) is selected in Solution Explorer and right clicked	Ok	20.05.2003
Update option is disabled in menu if unversioned VC# folder (status icon ❗) is selected in Solution Explorer and right clicked	Ok	20.05.2003
Update option is disabled in menu if unversioned VC++ folder (status icon ❗) is selected in Solution Explorer and right clicked	Update enabled for VC++ folders.	20.05.2003

Test	Result /Comment	Date
Update option is disabled in menu if unversioned VB project (status icon 🔑) is selected in Solution Explorer and right clicked	Ok	20.05.2003
Update option is disabled in menu if unversioned VB# project (status icon 🔑) is selected in Solution Explorer and right clicked	Ok	20.05.2003
Update option is disabled in menu if unversioned VC++ project (status icon 🔑) is selected in Solution Explorer and right clicked	Ok	20.05.2003
Update option is enabled in menu if versioned file (status icon ✔) is selected in Solution Explorer and right clicked	Ok.	20.05.2003
Update option is enabled in menu if versioned folder (status icon ✔) is selected in Solution Explorer and right clicked	Ok	20.05.2003
Update option is enabled in menu if versioned project (status icon ✔) is selected in Solution Explorer and right clicked.	Ok.	20.05.2003
Update option is enabled in menu if versioned solution (status icon ✔) is selected in Solution Explorer and right clicked.	Ok.	20.05.2003
Update option is enabled in menu if modified, versioned file (status icon M) is selected in Solution Explorer and right clicked.	Ok.	20.05.2003
Update option is enabled in menu if modified, versioned folder (status icon M) is selected in Solution Explorer and right clicked.	Ok.	20.05.2003
Update option is enabled in menu if modified, versioned project (status icon M) is selected in Solution Explorer and right clicked.	Ok.	20.05.2003
Update option is enabled in menu if modified, versioned solution (status icon M) is selected in Solution Explorer and right clicked.	Ok.	20.05.2003

Test	Result /Comment	Date
Update option is enabled in menu if added, versioned VB file (status icon ✸) is selected in Solution Explorer and right clicked.	Ok	20.05.2003
Update option is enabled in menu if added, versioned VC# file (status icon ✸) is selected in Solution Explorer and right clicked.	Ok	20.05.2003
Update option is enabled in menu if added, versioned VC++ file (status icon ✸) is selected in Solution Explorer and right clicked.	Ok	20.05.2003
Update option is enabled in menu if added, versioned VB folder (status icon ✸) is selected in Solution Explorer and right clicked.	Ok	20.05.2003
Update option is enabled in menu if added, versioned VC# folder (status icon ✸) is selected in Solution Explorer and right clicked.	Ok	20.05.2003
Update option is enabled in menu if added, versioned VC++ folder (status icon ✸) is selected in Solution Explorer and right clicked.	Ok	20.05.2003
Update option is enabled in menu if added, versioned VB project (status icon ✸) is selected in Solution Explorer and right clicked.	Ok	20.05.2003
Update option is enabled in menu if added, versioned VC# project (status icon ✸) is selected in Solution Explorer and right clicked.	Ok	20.05.2003
Update option is enabled in menu if added, versioned VC++ project (status icon ✸) is selected in Solution Explorer and right clicked.	Ok	20.05.2003
Ankh Lock Warning in case of locked item	Ok.	21.05.2003
Status icon is changed in front of file in Solution Explorer after versioned file is updated to modified, corresponding file	Ok	21.05.2003
Status icon is changed in front of folder in Solution Explorer after versioned folder is updated to modified, corresponding folder	Ok	21.05.2003

Test	Result /Comment	Date
Status icon is changed in front of project in Solution Explorer after versioned project is updated to modified, corresponding project	Ok	21.05.2003
Status icon is changed in front of solution in Solution Explorer after versioned solution is updated to modified, corresponding solution	Ok	21.05.2003
Ankh error handling if no communication to Internet Explorer for update to external repository	Ok	21.05.2003
Update works recursively on several items (file, folder, project, solution)	Ok	21.05.2003

5.4 Testing of commit in Solution Explorer

Tests performed to verify the *Commit* item menu option in Solution Explorer are listed in the table below. The *Commit* option publishes the latest changes by sending the changes to the repository. An image of the commit dialog is enclosed in the appendix.

Test	Result /Comment	Date
Commit option is disabled in menu if unversioned VC++ file (status icon) is selected in Solution Explorer and right clicked	Ok	20.05.2003
Commit option is disabled in menu if unversioned VC# file (status icon) is selected in Solution Explorer and right clicked	Ok	20.05.2003
Commit option is disabled in menu if unversioned VB file (status icon) is selected in Solution Explorer and right clicked	Ok	20.05.2003
Commit option is disabled in menu if unversioned VC# folder (status icon) is selected in Solution Explorer and right clicked	Ok	20.05.2003
Commit option is disabled in menu if unversioned VC++ folder (status icon) is selected in Solution Explorer and right clicked	Ok	20.05.2003

Test	Result /Comment	Date
Commit option is disabled in menu if unversioned VB folder (status icon) is selected in Solution Explorer and right clicked	Ok	20.05.2003
Commit option is disabled in menu if unversioned VC# project (status icon) is selected in Solution Explorer and right clicked	Ok	20.05.2003
Commit option is disabled in menu if unversioned VC++ project (status icon) is selected in Solution Explorer and right clicked	Ok	20.05.2003
Commit option is disabled in menu if unversioned VB project (status icon) is selected in Solution Explorer and right clicked	Ok	20.05.2003
Commit option is disabled in menu if versioned file (status icon) is selected in Solution Explorer and right clicked	Ok.	22.05.2003
Commit option is disabled in menu if versioned folder (status icon) is selected in Solution Explorer and right clicked	Ok.	22.05.2003
Commit option is disabled in menu if versioned project (status icon) is selected in Solution Explorer and right clicked	Ok.	22.05.2003
Commit option is disabled in menu if versioned solution (status icon) is selected in Solution Explorer and right clicked	Ok.	22.05.2003
Commit option is enabled in menu if modified, versioned file (status icon) is selected in Solution Explorer and right clicked	Ok.	22.05.2003
Commit option is enabled in menu if modified, versioned folder (status icon) is selected in Solution Explorer and right clicked	Ok.	22.05.2003
Commit option is enabled in menu if modified, versioned project (status icon) is selected in Solution Explorer and right clicked	Ok.	22.05.2003

Test	Result /Comment	Date
Commit option is enabled in menu if modified, versioned solution (status icon) is selected in Solution Explorer and right clicked	Ok.	22.05.2003
Commit option is enabled in menu if added, versioned VB file (status icon) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Commit option is enabled in menu if added, versioned VC# file (status icon) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Commit option is enabled in menu if added, versioned VC++ file (status icon) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Commit option is enabled in menu if added, versioned VC# folder (status icon) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Commit option is enabled in menu if added, versioned VC++ folder (status icon) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Commit option is enabled in menu if added, versioned VB folder (status icon) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Commit option is enabled in menu if added, versioned VB project (status icon) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Commit option is enabled in menu if added, versioned VC# project (status icon) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Commit option is enabled in menu if added, versioned VC++ project (status icon) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Commit option is enabled in menu if conflicted, versioned file (status icon) is selected in Solution Explorer and right clicked	Ok.	22.03.2003

Test	Result /Comment	Date
Commit option is enabled in menu if conflicted, versioned folder (status icon !) is selected in Solution Explorer and right clicked	Ok.	22.03.2003
Commit option is enabled in menu if conflicted, versioned project (status icon !) is selected in Solution Explorer and right clicked	Ok.	22.03.2003
Commit option is disabled in menu if locked, versioned file is selected in Solution Explorer and right clicked	Ok.	22.03.2003
Commit option is disabled in menu if locked, versioned folder is selected in Solution Explorer and right clicked	Ok.	22.03.2003
Commit option is disabled in menu if locked, versioned project is selected in Solution Explorer and right clicked	Ok.	22.03.2003
Commit dialog box pops up if **Commit** is selected from item menu	Ok.	22.03.2003
Status icon is changed to ✔ in front of file in Solution Explorer after modified, versioned file is committed	Ok.	22.03.2003
Status icon is changed to ✔ in front of folder in Solution Explorer after modified, versioned folder is committed	Ok.	22.03.2003
Status icon is changed to ✔ in front of project in Solution Explorer after added, versioned project is committed	Ok.	22.03.2003
Status icon is changed to ✔ in front of solution in Solution Explorer after added, versioned solution is committed	Ok.	22.03.2003
Ankh error handling if no communication to Internet Explorer for commit to external repository	Ok.	22.03.2003
Commit works recursively on several items (file, folder, project, solution)	Ok.	22.03.2003

5.5 Testing of diff in Solution Explorer

Tests performed to verify the *Diff* item menu option in Solution Explorer are listed in the table below. The *Diff* option makes it possible to see removed, added and unchanged text if the file is not binary. An image of the diff displayed in code view is enclosed in the appendix.

Test	Result /Comment	Date
Diff option is enabled in menu if modified, versioned file (status icon ▮) is selected in Solution Explorer and right clicked	Ok	25.05.2003
Diff option is enabled in menu if modified, versioned folder (status icon ▮) is selected in Solution Explorer and right clicked	Ok	25.05.2003
Diff option is enabled in menu if modified, versioned project (status icon ▮) is selected in Solution Explorer and right clicked	Ok	25.05.2003
Diff option is enabled in menu if modified, versioned solution (status icon ▮) is selected in Solution Explorer and right clicked	Ok	25.05.2003
Diff option is enabled in menu if added, versioned VB file (status icon ✦) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Diff option is enabled in menu if added, versioned VC# file (status icon ✦) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Diff option is enabled in menu if added, versioned VC++ file (status icon ✦) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Diff option is enabled in menu if added, versioned VB folder (status icon ✦) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Diff option is enabled in menu if added, versioned VC# folder (status icon ✦) is selected in Solution Explorer and right clicked	Ok	19.03.2003

Test	Result /Comment	Date
Diff option is enabled in menu if added, versioned VC++ folder (status icon 🔸) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Diff option is enabled in menu if added, versioned VB project (status icon 🔸) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Diff option is enabled in menu if added, versioned VC# project (status icon 🔸) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Diff option is enabled in menu if added, versioned VC++ project (status icon 🔸) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Diff is visible in temporary file in code view if **Diff** is performed on a file	Ok	25.05.2003
Diff is visible in temporary file in code view if **Diff** is performed on a folder	Ok	25.05.2003
Diff is visible in temporary file in code view if **Diff** is performed on a project	Ok	25.05.2003
Diff is visible in temporary file in code view if **Diff** is performed on a solution	Ok	25.05.2003
The diff visible in temporary file in code view shows unchanged text in green colour	Ok	25.05.2003
The diff visible in temporary file in code view shows removed text in red colour	Ok	25.05.2003
The diff visible in temporary file in code view shows new, added text in blue colour	Ok	25.05.2003
Diff works recursively on several items (file, folder, project, solution)	Ok	25.05.2003

5.6 Testing of delete/remove in Solution Explorer

Tests performed to verify the *Exclude From Project* and *Delete* item menu option in Solution Explorer are listed in the table below. The *Delete* option permanently deletes versioned items from the working copy. *Exclude From Project* option removes versioned items from the working copy.

Test	Result /Comment	Date
Versioned file in Solution Explorer is not visible after **Delete** option is selected from item menu for versioned file	Ok.	26.05.2003

Test	Result /Comment	Date
Versioned folder in Solution Explorer is not visible after **Delete** option is selected from item menu for versioned folder	Ok.	26.05.2003
Versioned project in Solution Explorer is not visible after **Remove** option is selected from item menu for versioned project	Ok.	26.05.2003
Delete option on item menu works recursively on several items (file, folder, project, solution)	Ok.	26.05.2003
Remove option on item menu works recursively on several items (file, folder, project, solution)	Ok.	26.05.2003

5.7 Testing of revert in Solution Explorer

Tests performed to verify the *Revert* item menu option in Solution Explorer are listed in the table below. The *Revert* option restores the pristine working copy. An image of the revert dialog is enclosed in the appendix.

Test	Result /Comment	Date
Revert option is disabled in menu if unversioned file (status icon) is selected in Solution Explorer and right clicked	Ok.	26.05.2003
Revert option is disabled in menu if unversioned folder (status icon) is selected in Solution Explorer and right clicked	Ok.	26.05.2003
Revert option is disabled in menu if unversioned project (status icon) is selected in Solution Explorer and right clicked	Ok.	26.05.2003
Revert option is disabled in menu if versioned file (status icon) is selected in Solution Explorer and right clicked	Ok.	26.05.2003
Revert option is disabled in menu if versioned folder (status icon) is selected in Solution Explorer and right clicked	Ok.	26.05.2003
Revert option is disabled in menu if versioned project (status icon) is selected in Solution Explorer and right clicked	Ok.	26.05.2003

Test	Result /Comment	Date
Revert option is disabled in menu if versioned solution (status icon ✔) is selected in Solution Explorer and right clicked	Ok.	26.05.2003
Revert option is enabled in menu if modified, versioned file (status icon 🅜) is selected in Solution Explorer and right clicked	Ok.	26.05.2003
Revert option is enabled in menu if modified, versioned folder (status icon 🅜) is selected in Solution Explorer and right clicked	Ok.	26.05.2003
Revert option is enabled in menu if modified, versioned project (status icon 🅜) is selected in Solution Explorer and right clicked	Ok.	26.05.2003
Revert option is enabled in menu if modified, versioned solution (status icon 🅜) is selected in Solution Explorer and right clicked	Ok.	26.05.2003
Revert option is enabled in menu if added, versioned VB file (status icon ✚) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Revert option is enabled in menu if added, versioned VC# file (status icon ✚) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Revert option is enabled in menu if added, versioned VC++ file (status icon ✚) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Revert option is enabled in menu if added, versioned VB folder (status icon ✚) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Revert option is enabled in menu if added, versioned VC# folder (status icon ✚) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Revert option is enabled in menu if added, versioned VC++ folder (status icon ✚) is selected in Solution Explorer and right clicked	Ok	19.03.2003

Test	Result /Comment	Date
Revert option is enabled in menu if added, versioned VB project (status icon ⚡) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Revert option is enabled in menu if added, versioned VC# project (status icon ⚡) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Revert option is enabled in menu if added, versioned VC++ project (status icon ⚡) is selected in Solution Explorer and right clicked	Ok	19.03.2003
Revert option is enabled in menu if deleted, versioned file is selected in Solution Explorer and right clicked	Ok.	26.05.2003
Revert option is enabled in menu if deleted, versioned folder is selected in Solution Explorer and right clicked	Ok.	26.05.2003
Revert option is enabled in menu if deleted, versioned project is selected in Solution Explorer and right clicked	Ok.	26.05.2003
Revert option is enabled in menu if conflicted, versioned file (status icon ❗) is selected in Solution Explorer and right clicked	Ok.	26.05.2003
Revert option is enabled in menu if conflicted, versioned folder (status icon ❗) is selected in Solution Explorer and right clicked	Ok.	26.05.2003
Revert option is enabled in menu if conflicted, versioned project (status icon ❗) is selected in Solution Explorer and right clicked	Ok.	26.05.2003
Revert option is disabled in menu if locked, versioned file is selected in Solution Explorer and right clicked	Ok.	26.05.2003
Revert option is disabled in menu if locked, versioned folder is selected in Solution Explorer and right clicked	Ok.	26.05.2003
Revert option is disabled in menu if locked, versioned project is selected in Solution Explorer and right clicked	Ok.	26.05.2003
Revert dialog box pops up if revert is selected from file menu for VB file	Ok	19.05.2003
Revert dialog box pops up if revert is selected from file menu for VC# file	Ok	19.05.2003

Test	Result /Comment	Date
Revert dialog box pops up if revert is selected from file menu for VC++ file	Ok	19.05.2003
Revert dialog box pops up if revert is selected from folder menu for VB folder	Ok	19.05.2003
Revert dialog box pops up if revert is selected from folder menu for VC# folder	Ok	19.05.2003
Revert dialog box pops up if revert is selected from folder menu for VC++ folder	Ok	19.05.2003
Revert dialog box pops up if revert is selected from project menu for VB project	Ok	19.05.2003
Revert dialog box pops up if revert is selected from project menu for VC# project	Ok	19.05.2003
Revert dialog box pops up if revert is selected from project menu for VC++ project	Ok	19.05.2003
Revert dialog box pops up if revert is selected from solution menu for VB solution	Ok	19.05.2003
Revert dialog box pops up if revert is selected from solution menu for VC# solution	Ok	19.05.2003
Revert dialog box pops up if revert is selected from solution menu for VC++ solution	Ok	19.05.2003
If **Ok** button in Revert dialog box is clicked the item is reverted	Ok.	19.05.2003
If **Cancel** button in Revert dialog box is clicked the item is not reverted	Ok.	26.05.2003
Status icon is changed to ✔ in front of file in Solution Explorer after modified, versioned file is reverted	Ok.	26.05.2003
Status icon is changed to ✔ in front of folder in Solution Explorer after modified, versioned folder is reverted	Ok.	26.05.2003
Status icon is changed to ✔ in front of project in Solution Explorer after modified, versioned project is reverted	Ok.	26.05.2003
Status icon is changed to ✔ in front of solution in Solution Explorer after modified, versioned solution is reverted	Ok.	26.05.2003
Revert option in item menu works recursively on several items (file, folder, project, solution)	Ok.	26.05.2003

5.8 Testing of Commit dialog

Tests performed to verify the commit dialog are listed in the table below. The commit dialog shows paths for files to be committed and add a log message to the new revision when the *Ok* button is clicked. It is also possible to see the difference between added, removed and unchanged text by clicking on the *Diff* button. An image of the commit dialog is enclosed in the appendix.

Test	Result /Comment	Date
Correct path of VC# file to be committed is visible in upper part of commit dialog if file is selected to be committed	Ok	20.05.2003
Correct path of folder to be committed is visible in upper part of commit dialog if folder is selected to be committed	Ok.	15.05.2003
Correct path of project to be committed is visible in upper part of commit dialog if project is selected to be committed	Ok.	15.05.2003
Correct path of solution to be committed is visible in upper part of commit dialog if solution is selected to be committed	Ok.	15.05.2003
Correct path of items to be committed is visible in upper part of commit dialog if file, folder, project and solution is selected to be committed. (Recursive check)	Ok.	15.05.2003
It is not possible to delete or print in upper text area (read only) in commit dialog	Ok	20.05.2003
Default log message starts with the text # All lines starting with a # will be ignored	Ok	20.05.2003
Check that all lines after the text # All lines starting with a # will be ignored actually is ignored in the log message after commit	Ok	20.05.2003
Correct path is displayed on VC# file in lower text area if file is selected to be committed	Ok	19.05.2003

Test	Result /Comment	Date
Correct path is displayed on folder in lower text area if folder is selected to be committed	Ok.	15.05.2003
Correct path is displayed on project in lower text area if project is selected to be committed	Displayed the path to the file to be committed within the project. Did not display path to project file. Tested C# project	19.05.2003
Correct path is displayed on solution in lower text area if solution is selected to be committed	Ok.	15.05.2003
Correct path is displayed on items in lower text area if file, folder, project, solution is selected to be committed. (Recursive check)	Ok.	19.05.2003
If **Show diff** button is clicked the difference between added, removed an unchanged text is displayed	Ok	19.05.2003
If **Show diff** button is clicked the name of the button is changed to **Hide diff**	Ok	19.05.2003
If **Hide diff** button is clicked the diff-area is removed	Ok	19.05.2003
If **Hide diff** button is clicked the name of the button is changed to **Show diff**	Ok	19.05.2003
If **Ok** button is clicked status icons are changed in Solution Explorer and feedback is shown in AnkhSVN output	Ok tested on C# file	19.05.2003
If **Cancel** button is clicked status icons are not changed in Solution Explorer and feedback (indicating that nothing has been performed) is shown in AnkhSVN output	Ok	19.05.2003

5.9 Testing of Login dialog

Tests performed to verify the Login dialog are listed below. The Login dialog authenticates the user by username and password. If Save button is clicked in the dialog the dialog will remember the password next time the login dialog pops up. An image of the Login dialog is shown in the appendix.

Test	Result /Comment	Date
Svn error handling if username don't correspond to password and Ok button is clicked.	Ok.	15.05.2003
Svn error handling if password is not correct and Ok button is clicked.	Ok.	15.05.2003
If Ok button is clicked for correct password and username	Ok.	15.05.2003
Cancel operation if Cancel button is clicked	Ok.	15.05.2003

5.10 Testing of feedback in AnkhSVN output pane

Tests performed to verify the AnkhSVN output pane are listed in the table below. The AnkhSVN output shows feedback from the add, update, commit, revert and cleanup options. An image of the AnkhSVN output pane is enclosed in the appendix.

Test	Result /Comment	Date
If AnkhSVN output is not visible in VS.NET. View $\rightarrow$ Other Windows $\rightarrow$ Output display AnkhSVN output	Ok.	22.05.2003
Feedback from svn is shown in output pane if **add** is performed on a VB file	Ok	19.03.2003
Feedback from svn is shown in output pane if **add** is performed on a VC# file	Ok	19.03.2003
Feedback from svn is shown in output pane if **add** is performed on a VC++ file	Ok	19.03.2003
Feedback from svn is shown in output pane if **add** is performed on a VB folder	Ok	19.03.2003
Feedback from svn is shown in output pane if **add** is performed on a VC# folder	Ok	19.03.2003
Feedback from svn is shown in output pane if **add** is performed on a VC++ folder	Ok	19.03.2003
Feedback from svn is shown in output pane if **add** is performed on a VB project	Ok	19.03.2003

Test	Result /Comment	Date
Feedback from svn is shown in output pane if **add** is performed on a VC# project	Ok	19.03.2003
Feedback from svn is shown in output pane if **add** is performed on a VC++ project	Ok	19.03.2003
Feedback from svn is shown in output pane if **update** is performed on a file	Ok.	22.05.2003
Feedback from svn is shown in output pane if **update** is performed on a folder	Ok.	22.05.2003
Feedback from svn is shown in output pane if **update** is performed on a project	Ok.	22.05.2003
Feedback from svn is shown in output pane if **update** is performed on a solution	Ok.	22.05.2003
Feedback from svn is shown in output pane if **commit** is performed on a file	Ok.	22.05.2003
Feedback from svn is shown in output pane if **commit** is performed on a folder	Ok.	22.05.2003
Feedback from svn is shown in output pane if **commit** is performed on a project	Ok.	22.05.2003
Feedback from svn is shown in output pane if **commit** is performed on a solution	Ok.	22.05.2003
Feedback from svn is shown in output pane if **revert** is performed on a VB file	Ok	19.05.2003
Feedback from svn is shown in output pane if **revert** is performed on a VC# file	Ok	19.05.2003
Feedback from svn is shown in output pane if **revert** is performed on a VC++ file	Ok	19.05.2003
Feedback from svn is shown in output pane if **revert** is performed on a VB folder	Ok	19.05.2003
Feedback from svn is shown in output pane if **revert** is performed on a VC# folder	Ok	19.05.2003
Feedback from svn is shown in output pane if **revert** is performed on a VC++ folder	Ok	19.05.2003
Feedback from svn is shown in output pane if **revert** is performed on a VB project	Ok	19.05.2003

Test	Result /Comment	Date
Feedback from svn is shown in output pane if **revert** is performed on a VC# project	Ok	19.05.2003
Feedback from svn is shown in output pane if **revert** is performed on a VC++ project	Ok	19.05.2003
Feedback from svn is shown in output pane if **revert** is performed on a solution	Not ok, reverted VB, VC#, VC++ and Help project, but displayed an error message.	19.05.2003

5.11 Testing of Ankh integration in Solution Explore

Tests performed to verify the successful integration of Ankh into Solution Explorer are listed in the table below.

Test	Result /Comment	Date
All working copy items (complete file tree) are listed in Solution Explorer "show all files" view with status icons	Ok for VC++ projects.	19.03.2003
All working copy items (complete file tree) are listed in Solution Explorer "show all files" view with status icons	Ok for VC# projects.	19.03.2003
All working copy items (complete file tree) are listed in Solution Explorer "show all files" view with status icons	VB project icon sometimes disappear, but gets back if refresh option is ran	19.03.2003
Close Solution Explorer if it is open. Open **View → Solution Explorer**. All working copy items with status icons are displayed in Solution Explorer	Ok	19.03.2003
Ankh working copy display in Solution Explorer is not negatively affected by VS.NETs "Refresh" option	Ok	19.03.2003

5.12 Testing of the Repository Explorer

Tests performed to verify the Repository Explorer are listed in the table below. The Repository Explorer shows files and folders with icons in a file tree view. An image of Repository Explorer and Date picker are enclosed in the appendix.

Test	Result /Comment	Date
Repository Explorer is visible as default if new instance of VS.NET is opened	Ok.	19.03.2003

Test	Result /Comment	Date
VS.NET icons indicating the difference between file, folder, project and solution are shown in front of each item if valid url and revision is selected and Go button is clicked	Ok	19.03.2003
All repository items are displayed with icons in Repos Explorer if Repository Explorer is opened from Main menu. Close Repository Explorer if it is open. Open **View → Repos Explorer**	Ok	19.03.2003
Go button is enabled by default, valid revision and url are displayed	Ok	19.03.2003
Go button is disabled if revision is not defined in revision combo but url is defined	Ok	19.03.2003
Go button is disabled if revision is defined in revision combo but url is not defined	Not Ok. Go button is enabled if url is not defined.	19.03.2003
Error dialog pops up if url is not valid and **Go** button is clicked	Ok	19.03.2003
Warning dialog pops up if revision number is not valid and **Go** button is clicked	Ok	19.03.2003
Date combo is enabled if Date is selected revision	Ok	19.03.2003
Date combo is disabled if Head is selected revision	Ok	19.03.2003
Date combo is disabled if revision number is selected	Ok	19.03.2003
Calendar is displayed if Date combo is clicked and selected revision is Date	Ok	19.03.2003
File tree view is displayed if valid url and valid revision is selected and **Go** button is clicked	Ok	19.03.2003
File tree view is displayed if valid url and valid revision number is printed and **Go** button is clicked	Ok	19.03.2003

5.13 Error handling

Error handling is separated into two categories to handle SVN errors and Ankh errors. As Subversion is still under development there are still some weaknesses that are captured through SVN error handling.
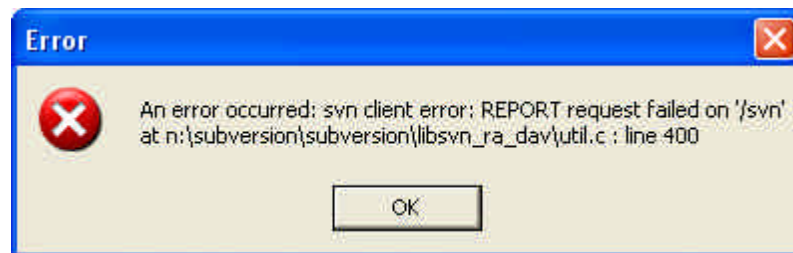
This error message was the result of an exception thrown from SVN. Error messages caused by defects in Ankh are captured via Ankh error handling. We continuously collect information about unhandled exceptions from SVN as well as Ankh as a result of these error mails.
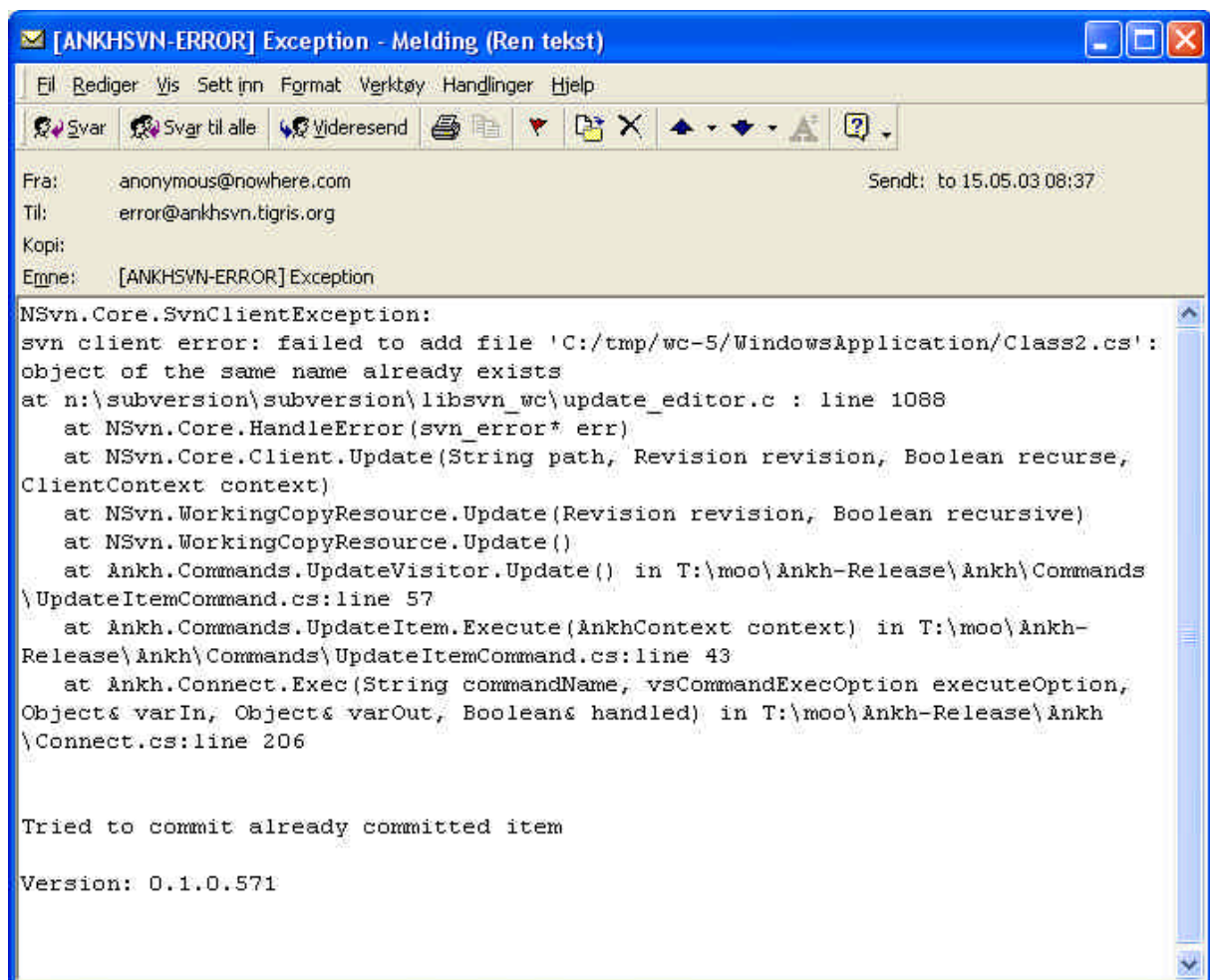
6 Conclusion

Ankh was unit tested with NUnit and built outside VS.NET with NAnt continuously during the development phase to secure quality and sanity. Ankh was tested functionally by using Ankh while developing Ankh. The intended audience at http://ankhsvn.tigris.org tested ankh. Feedback from these users provided useful information used to decide what was to be improved and ideas for new features. The already mentioned, early paper prototype testing of the GUI confirmed that our navigation model was logical and intuitive and gave us useful ideas of how to improve the GUI. Throughout the development process the testing strategy has paid off by not only providing a measurable indication of reliability but also by making defects apparent so that they could be addressed and resolved efficiently. Error messages are divided in 2 categories Ankh errors and SVN errors that reflect two different tools under development.

7 Appendix

7.1 Dictionary

Addin   A software component that extends the functionality of another product.

Alpha release   Alpha is the first release to the general public where basic functionality exists and a reasonable amount of stability is present. Some features may still be absent and there are probably major defects still in the code

API   Application Program Interface

Base revision   Last committed or updated revision

Beta release   A beta release is significantly more advanced than the alpha release. While still not completely stable because of lingering bugs, all features planned for the final release should be present and reasonably reliable. This is when the more elusive bugs will be become apparent.

COM   Component Object Model (COM), a software architecture that allows the components made by different software vendors to be combined into a variety of applications. COM defines a standard for component interoperability. It is not dependent on any particular programming language, is available on multiple platforms, and is extensible.

Commit   Send changes from your working copy to the repository.

Conflicted file   If two users modify the same file at the same line a conflict will occur if the file is under revision control. The conflict occurs because the repository simply doesn't know whether both or only one of the lines should be added.

CVS   Concurrent Versions System -A free open source version control system, the predecessor to Subversion.

DLL   Dynamic Link Library

Doxygen   Doxygen is a documentation system for C++, C, Java, IDL (Corba, Microsoft, and KDE-DCOP flavours);and to some extent PHP and C#. The documentation is extracted directly from the sources, which makes it much easier to keep the documentation consistent with the source code. It can generate an on-line documentation browser (in HTML) and/or an off-line reference manual from a set of documented source files.

|	
Draco.NET	Draco.NET is an automated build system. It monitors your source repository, automatically rebuilds your project when changes are detected and e-mails you the build result along with a list of changes since the last build. Draco.NET version 1.4 supports the NAnt build tool. It now also supports Subversion as we contributed code to their repository.
Folder	Directory
GUI	Graphical User Interface
Head revision	Last revision in repository
Item	File, folder, project or solution
IDE	Integrated Development Environment
IIS	Internet Information Server
IL	Intermediate Language, the bytecode to which all languages in the .NET framework compile.
NAnt	A free .NET build tool.
NUnit	A unit testing framework, based on JUnit and part of the xUnit family. .
Repository	The server component of the Subversion version control system; this is where your files get stored.
Repository Explorer	An Ankh tool used to browse a Subversion repository.
Revision control system	In a typical software development environment, many developers will be engaged in work on one code base. Revision control makes it easier for several people to share the same collection of program source code. A revision control system is a centralised system for sharing information where the core is a repository.
Solution Explorer	A window in VS.NET used to manage files in a project/solution
SVN	Short name for Subversion, which is a free open source revision control system.
SWIG	Simplified Wrapper and Interface Generator
UI	User Interface
UML	Unified Modelling Language
Unversioned file	File not under version control
VB	Visual Basic .NET
VC++	Visual C++ .NET
VC#	Visual C# .NET
Versioned file	File under version control
VS .NET	Visual Studio .NET. A programming platform that includes environments for developing C#, C++, Managed C++ and Visual Basic programs.
WC	Short for Working Copy.
Working Copy	Collection of files and directories under revision control.

7.2 Ankh screenshots

This appendix shows images of menus, dialog boxes, file tree views, output panes etc. used by Ankh. This part is included to make it possible for the reader to read this report independently from the process and product documentation. The aim of this appendix is to quickly update the reader about the environment the tests are performed in based on minimum knowledge about VS.NET and Ankh on before hand.
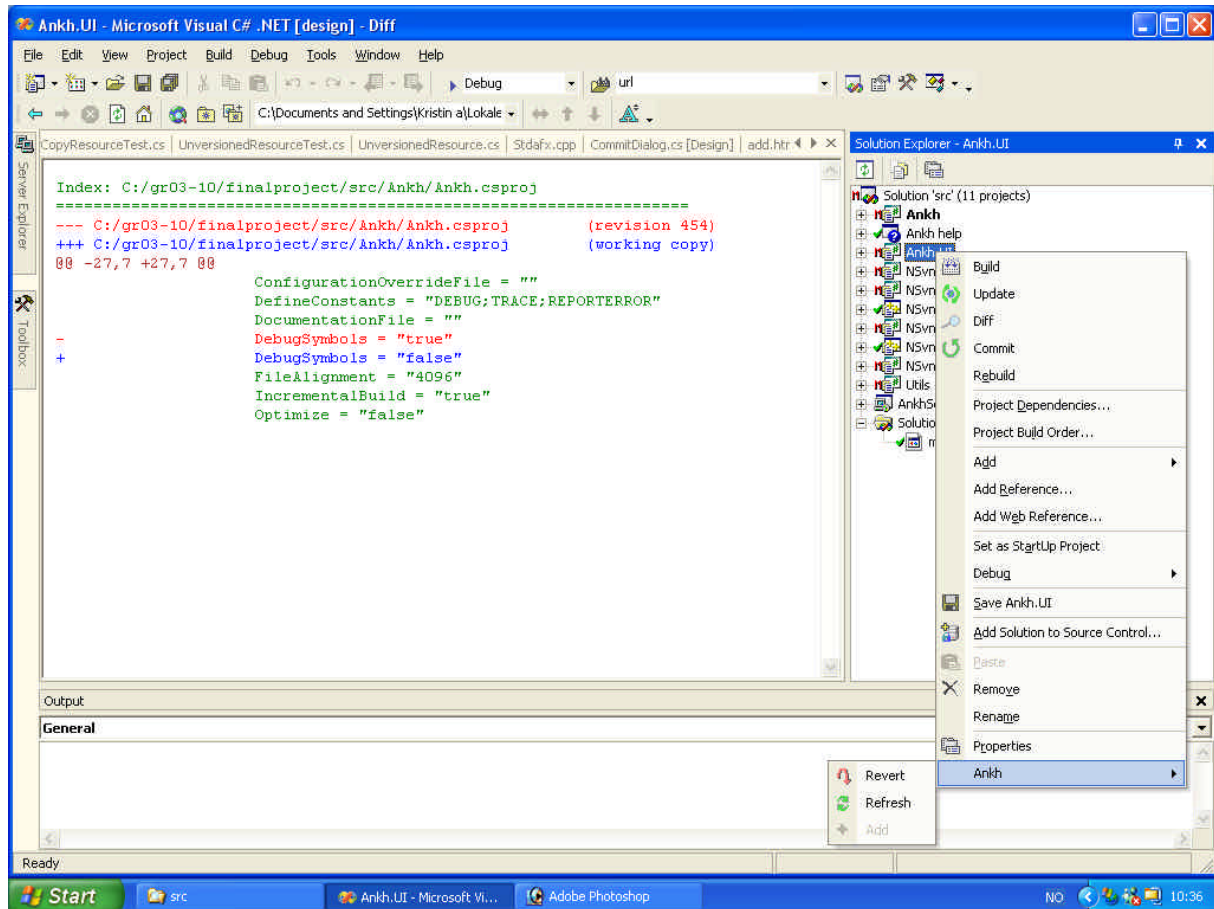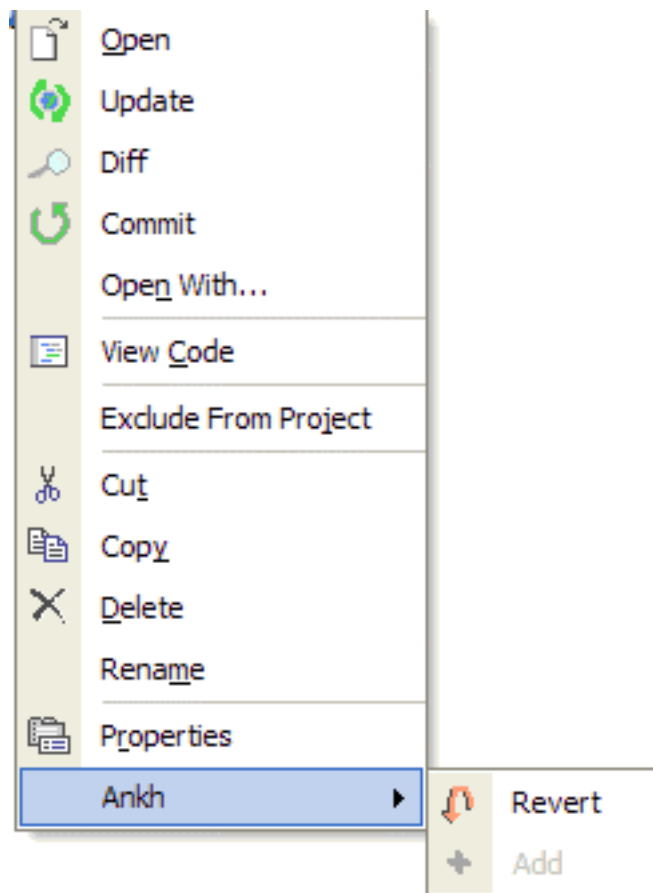
7.2.1 AnkhSVN output pane

7.2.2 Commit dialog
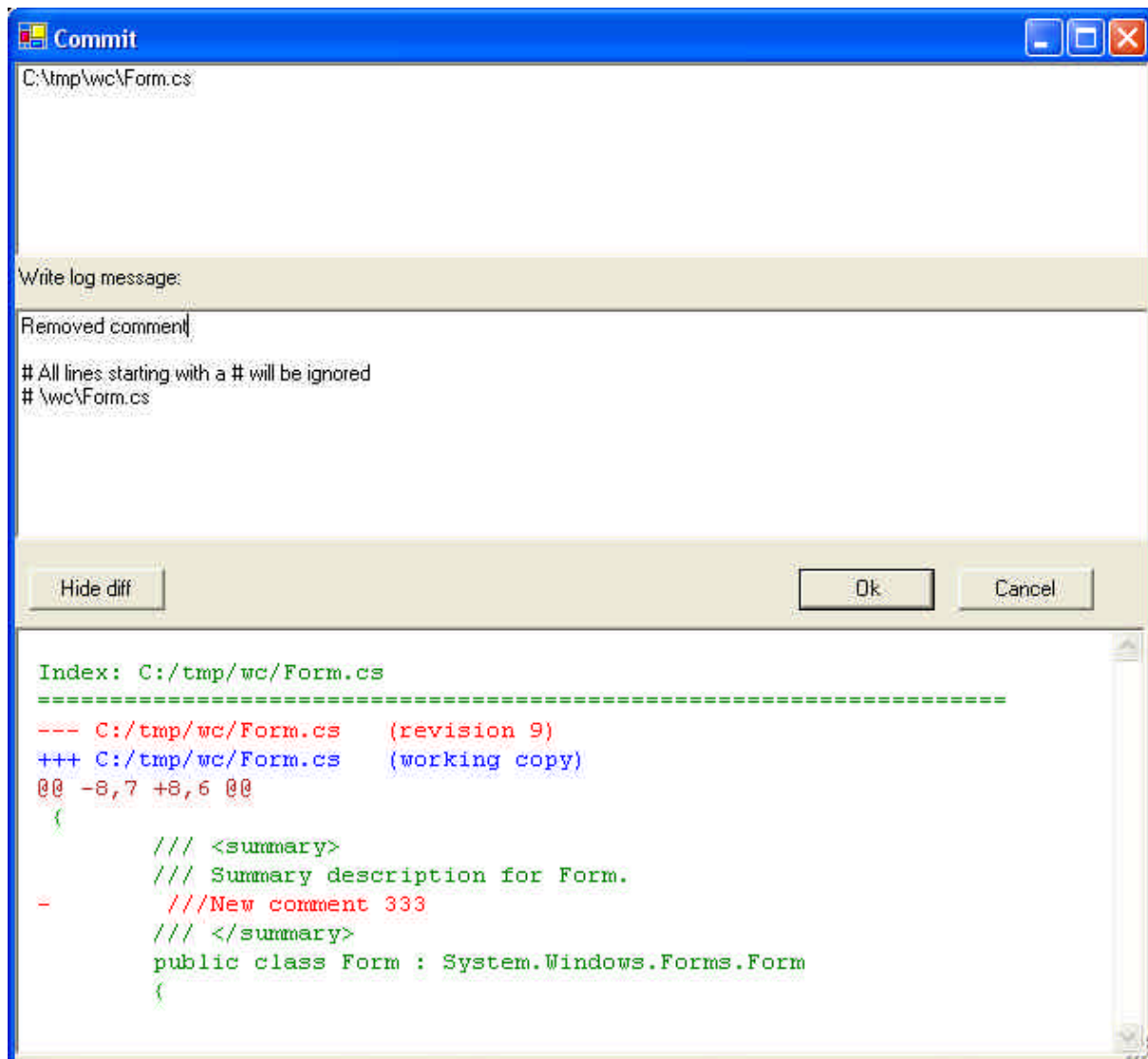
7.2.3 Date picker

7.2.4 Diff in code view
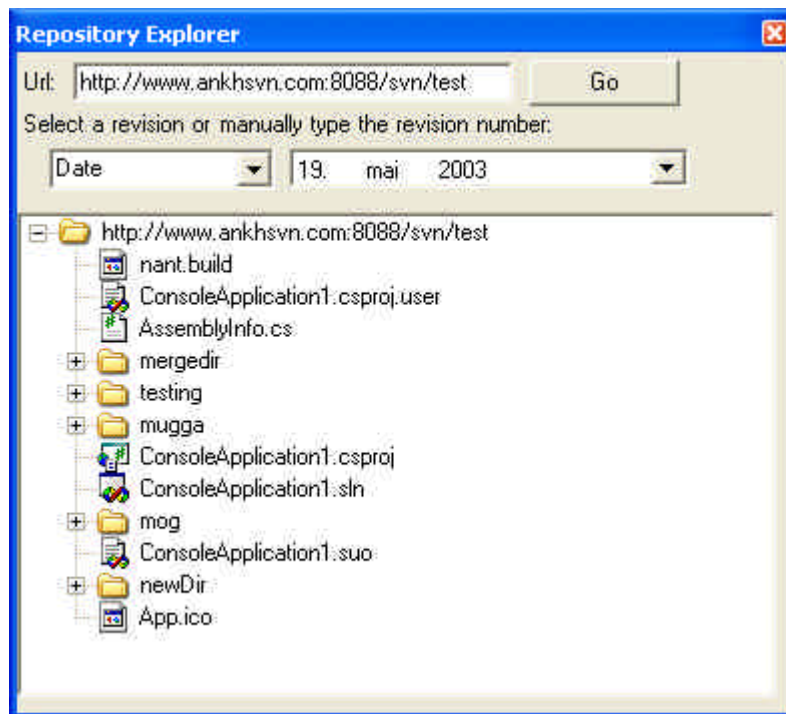
7.2.5 Item menu

7.2.6 Login dialog

7.2.7 Repository Explorer

7.2.8 Revert dialog

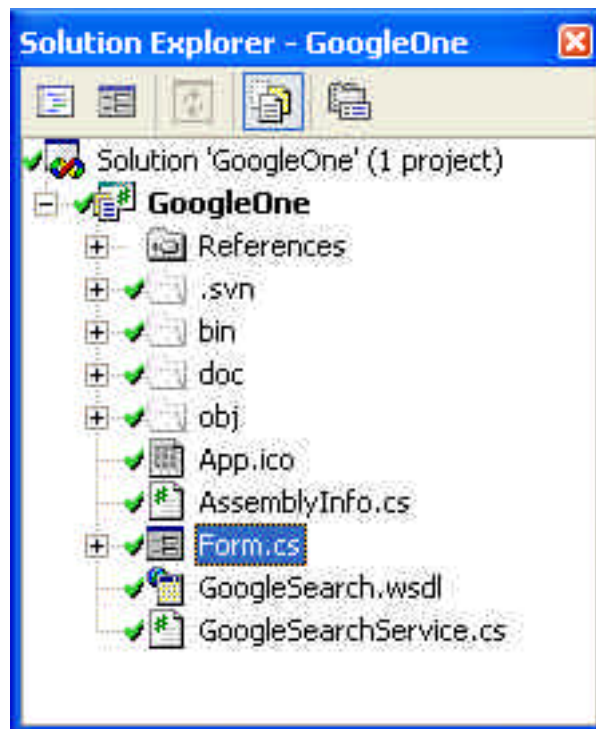### 7.2.9 Solution Explorer

7.2.10   Ankh warning