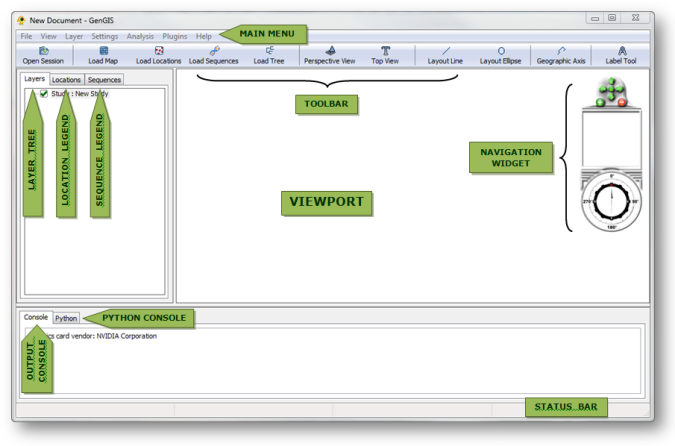
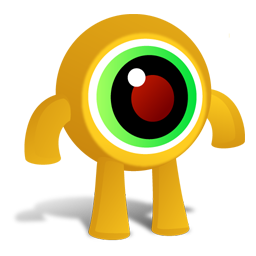
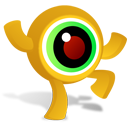
The Handy GenGIS Developer’s Manual

Contributed by Timothy Mankowski



*A guide for new generations of GenGIS developers*

*For in-lab use only*

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This manual is available to be used by all GenGIS developers under certain restrictions. If you are contributing to this manual, feel free to add your name to the list of authors but remember to give credit to all other authors.

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# CHAPTER 0: Overview of this Manual

First and foremost, this manual is intended to reside on the GenGIS SVN where it can be read, updated and edited by all GenGIS developers. That said, please keep this manual up-to-date so that it can continue to serve new generations of GenGIS developers!

**A Guide on What to Read (For the Impatient)**…

…

# CHAPTER 1: Releasing GenGIS to the World

## 1.1 Important Things to Update Before Every Release

1. Update the **Release Notes** section of the About dialog. If any new authors have contributed since the last release, add them to the **Authors** section.

|  |
| --- |
| W:\GenGIS\bin\images\CrazyEye\linux\CrazyEye_Sad_24x24.png How do I do that?   1. Access the About dialog within GenGIS by going to the Help → About … (Windows) or GenGIS → About… (Mac) menus. 2. The contents of the About dialog are stored as three separate HTML files within the ‘bin’ directory of the GenGIS repository - *authors.html*, *license.html* and *release\_notes.html*. Edit these as you would any other HTML file. Note that only plain HTML is supported (i.e., no CSS/JavaScript/other…). 3. The Release Notes section reflects information that is posted to the *Revision History* section of the GenGIS Wiki (<http://kiwi.cs.dal.ca/GenGIS/Revision_History>).   Note that changes to any of these files does not require GenGIS to be recompiled, in fact, you can keep GenGIS open while reopening the About dialog to see new changes appear. |

2. (C++) In **App.hpp**, update the APP\_VERSION (enumeration data type) such that APP\_VERSION::**GENGIS\_VERSION** is set to the latest release (e.g., GENGIS\_VERSION = V2\_04) and APP\_VERSION::**SAVE\_VERSION** reflects the last version of GenGIS whose session file is compatible with the current release (e.g., SAVE\_VERSION = V2\_02).

|  |
| --- |
| W:\GenGIS\bin\images\CrazyEye\linux\CrazyEye_Sad_24x24.png What exactly does this mean?   * APP\_VERSION is an enum data type that stores different GenGIS version numbers starting at version 0 (version 0 corresponds to release 2.00). * APP\_VERSION::*GENGIS\_VERSION* corresponds to the current release. * APP\_VERSION::*SAVE\_VERSION* corresponds to the last version of GenGIS whose session files are compatible with the current release (GENGIS\_VERSION). * APP\_VERSION::*V2\_xx* corresponds to previous versions of GenGIS.   W:\GenGIS\bin\images\CrazyEye\linux\CrazyEye_Sad_24x24.png What is this for?   * This numbering system helps keep track of the serialization system – the ability to load and save sessions within GenGIS. * Each time changes are made to serialization (e.g., a new variable is added to a class that needs to be preserved between sessions), SAVE\_VERSION must be incremented so that attempting to load an incompatible session file does not crash GenGIS.   W:\GenGIS\bin\images\CrazyEye\linux\CrazyEye_Dance_24x24.png In summary (what you should remember):   * When a new version is released, GENGIS\_VERSION is always updated. * If changes have been made to serialization, update SAVE\_VERSION. |

2. Update the **m\_appVersion** member variable in the constructor of **App.cpp**.

3. Update latest release information on the Kiwi server (“Help → Check for Updates” functionality)

|  |
| --- |
| W:\GenGIS\bin\images\CrazyEye\linux\CrazyEye_Sad_24x24.png How do I do that?   * Log into Kiwi using the ‘GenGIS’ username (ask Rob for the password) * From the home directory, go to the ‘Sites/gengis\_dev’ folder * Open version.txt and update the number inside to match APP\_VERSION::*GENGIS\_VERSION (explained previously).* * Open description.txt and update the description to correspond to the latest release. * Save all your work. ☺ |

4. Update the GenGIS Wiki page

|  |
| --- |
| W:\GenGIS\bin\images\CrazyEye\linux\CrazyEye_Sleep_24x24.png Which pages do I update?   * Main Page - <http://kiwi.cs.dal.ca/GenGIS/Main_Page> Introductory paragraph and Announcements sections * Download - <http://kiwi.cs.dal.ca/GenGIS/Download> Binaries and source code for latest release; links to previous release binaries and source code should be moved to the ‘Previous Versions’ section at the bottom of the page. * Revision History - <http://kiwi.cs.dal.ca/GenGIS/Revision_History> * The GenGIS 2.0 Manual - <http://kiwi.cs.dal.ca/GenGIS/The_GenGIS_2.0_Manual> Update any new features that require documentation. * Known Issues - <http://kiwi.cs.dal.ca/GenGIS/Known_issues> * New Features in GenGIS 2.0 - <http://kiwi.cs.dal.ca/GenGIS/New_Features_in_GenGIS_2.0> Consult with Rob Beiko before making any changes to this page. * FAQ - <http://kiwi.cs.dal.ca/GenGIS/FAQ> |

5. Update this manual

|  |
| --- |
| W:\GenGIS\bin\images\CrazyEye\linux\CrazyEye_Dance_24x24.png One last thing…  Help keep the GenGIS project alive by keeping this manual up-to-date.  *Thank you for reading this section and for contributing to GenGIS!* |

## 1.2 Creating the Windows Installer Package

|  |
| --- |
| W:\GenGIS\bin\images\CrazyEye\linux\CrazyEye_Dance_24x24.png Environment Setup   * In order to complete this section, you will need to install InnoInstaller version 5.4.3 which is available from <http://www.jrsoftware.org/isinfo.php>. |

**To generate the GenGIS installation file:**

1. Go to the ‘win32\InnoInstaller’ directory
2. Open up GenGIS.iss using Inno Setup Compiler
3. From the 'Run' menu, select 'Run' (or hit F9) to compile the project

The output file ‘GenGIS-Setup.exe’ should be located in the ‘win32\InnoInstaller\Setup’ directory of the SVN

**Create the installer archive:**

1. Create a new folder called ‘GenGIS\_v2.*xx*\_Windows’, where 2.xx is the intended release number
2. Copy GenGIS-Setup.exe to the new folder
3. Copy two files – *Install.txt*, *License.txt* – from ‘win32\InnoInstaller\IncludeWithRelease’ to the new folder
4. Download *vcredist\_x86.exe* (Microsoft Visual C++ 2008 SP1 Redistributable Package (x86)) from <http://www.microsoft.com/en-us/download/details.aspx?id=5582&WT.mc_id=MSCOM_EN_US_DLC_DETAILS_121LSUS007998> and include it in the new folder.
5. Compress the GenGIS\_v2.*xx*\_Windows folder as a ZIP file.

## 1.3 Creating the MacOSX Installer Image

Chapter 2: Setting Up the Development Environment

2.1 Setting Up a Windows Development Environment

2.2 Setting Up a MacOS X Development Environment

CHAPTER 2: GenGIS Codebase

2.1 What do all these repository folders do?

2.2 A Brief Overview of the GenGIS Codebase

CHAPTER 3: Serialization Concepts in GenGIS

Chapter N: Quirky Things on the Mac Side

1. Custom Colour Buttons

2. The Famous Viewport Refresh Bug

# CHAPTER 2: Properties Dialogs, their Corresponding C++ Classes and Variables

## 2.1 Study Properties

### 2.1.1 General Tab

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name (Type)** | **Serialization Status** |
| Layer name (Textbox) | Layer::*m\_name* (std::wstring) | Serialized |
| Description (Textbox) | Layer::*m\_description* (std::wstring) | Serialized |
| Authors (Textbox) | Layer::*m\_authours* (std::wstring) | Serialized |

### 2.1.2 Projection Tab

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name (Type)** | **Serialization Status** |
| Datum (Drop-down menu) | StudyModel::*m\_datum* (std::wstring) | Serialized |
| Projection (Drop-down menu) | StudyModel::*m\_projection* (std::wstring) | Serialized |

### 2.1.3 Symbology Tab

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name (Type)** | **Serialization Status** |
| *Viewport Properties* | | |
| Background colour (Colour picker) | Viewport::*m\_bgColour* (GenGIS::Colour) | Serialized |
| Terrain resolution (Drop-down menu) | Viewport::*m\_maxTerrainResolution* (int) | Unknown |

## 2.2 Map Properties

### 2.2.1 General Tab

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name (Type)** | **Serialization Status** |
| Layer name (Textbox) | Layer::*m\_name* (std::wstring) | Serialized |
| Description (Textbox) | Layer::*m\_description* (std::wstring) | Serialized |
| Authors (Textbox) | Layer::*m\_authours* (std::wstring) | Serialized |

### 2.2.2 Symbology Tab

#### 2.2.2.1 Colour Map Tab

|  |  |  |
| --- | --- | --- |
| **Name (Description)** | **Variable Name (Type)** | **Serialization Status** |
| *Colour Map* | | |
| Colour map (Drop-down menu) | MapTexture::*m\_colourMap* (ColourMapDiscretePtr) | Serialized |
| Interpolation (Drop-down menu) | MapTexture::*m\_interpolate* (INTERPOLATE) | Serialized |
| Number Entries (Textbox) | MapTexture::*m\_numColours* (uint) | Serialized |
| [Map Colour] (Colour picker) | MapTexture::*m\_colours* (boost::scoped\_array<ColourPtr>) | Serialized |
| [Map Colour Interval] (Textbox) | MapTexture::*m\_intervals* (boost::scoped\_array<float>) | Serialized |

#### 2.2.2.2 Advanced Tab

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name & Type** | **Serialization Status** |
| Wireframe (Checkbox) | MapView::*m\_bWireFrame* (bool) | Serialized |
| *Display Properties* | | |
| Vertical exaggeration | MapModel::*m\_verticalExaggeration* (float) | Serialized |
| Level of Detail (Control slider) | MapView::*m\_epsilon* (GLdouble) | Not serialized |
| *Transparency* | | |
| Transparency (Control slider) | MapTexture::*m\_transparencyPercentage* (uint) | Serialized |

### 2.2.3 Metadata Tab

No modifiable data

## 2.3 Location Set Properties

### 2.3.1 General Tab

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name & Type** | **Serialization Status** |
| Layer name | wstring | Serialized |
| Description | wstring | Serialized |
| Authors | wstring | Serialized |

### 2.3.2 Location Set Tab

#### 2.3.2.1 Colour Tab

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name & Type** | **Serialization Status** |
| *Colour Properties* | | |
| Uniform colour | Checkbox | Serialized |
| Uniform colour | Colour picker | Serialized |
| Field to chart | Drop-down menu | Serialized |
| Colour map | Drop-down menu | Serialized |
| [Individual colours] | Colour picker | Serialized |
| *Borders* | | |
| Size | Integer | Serialized |
| Size [colour] | Colour picker | Serialized |

#### 2.3.2.2 Shape Tab

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name & Type** | **Serialization Status** |
| *Shape Properties* | | |
| Uniform shape | Checkbox | Serialized |
| Uniform shape | Drop-down menu | Serialized |
| Field to chart | Drop-down menu | Serialized |
| Shape map | Drop-down menu | Serialized |
| [Individual shapes] | Drop-down menu | Serialized |

#### 2.3.2.3 Size Tab

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name & Type** | **Serialization Status** |
| *Size Properties* | | |
| Field to chart | Drop-down menu | Serialized |
| Min | Float | Serialized |
| Max | Float | Serialized |

#### 2.3.2.4 Label Tab

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name & Type** | **Serialization Status** |
| *Label Properties* | | |
| Show labels | Checkbox | Serialized |
| Bind labels to charts | Checkbox | Serialized |
| Label field | Drop-down menu | Serialized |
| Label size | Integer | Almost serialized |
| Label position | Drop-down menu | Serialized |
| Label style | Drop-down menu | Serialized |
| Label colour | Colour picker | Serialized |

### 2.3.3 Charts Tab

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name & Type** | **Serialization Status** |
| Show charts | Checkbox | Serialized |

#### 2.3.3.1 Colour Map Tab

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name & Type** | **Serialization Status** |
| *Field Properties* | | |
| Field to chart | Drop-down menu | Serialized |
| Colour map | Drop-down menu | Serialized |
| Colour [colour] | Colour picker | Serialized |
| Create quantitative charts using count data in field | Checkbox | Not serialized |
| Create quantitative charts using count data in field | Drop-down menu | Not serialized |

#### 2.3.3.2 Symbology Tab

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name & Type** | **Serialization Status** |
| *Chart Properties:* ***Pie Chart*** | | |
| Chart type | Drop-down menu | Serialized |
| Display in 2D | Checkbox | Serialized |
| Diameter | Integer | Serialized |
| Set chart size proportional to number of sequences | Checkbox | Serialized |
| Min Size | Integer | Serialized |
| Max Size | Integer | Serialized |
| Chart border size | Integer | Serialized |
| Show individual element borders | Checkbox | Serialized |
| Assign taxa to other (percentage) | Integer / Float (?) | Serialized |
| *Chart Properties:* ***Bar Chart*** | | |
| Chart type | Drop-down menu | Serialized |
| Display in 2D | Checkbox | Serialized |
| Width | Integer | Serialized |
| Height | Integer | Serialized |
| Set chart size proportional to number of sequences | Checkbox | Serialized |
| Min Size | Integer | Serialized |
| Max Size | Integer | Serialized |
| Chart border size | Integer | Serialized |
| Bottom border | Checkbox | Serialized |
| Left border | Checkbox | Serialized |
| Top border | Checkbox | Serialized |
| Right border | Checkbox | Serialized |
| Show individual element borders | Checkbox | Serialized |
| Background colour | Colour picker | Serialized |
| Transparent | Checkbox | Serialized |

|  |  |  |
| --- | --- | --- |
| *Dropline Properties* | | |
| Line style | Drop-down menu | Serialized |
| Line thickness | Integer | Serialized |
| Line thickness [colour] | Colour picker | Serialized |

### 2.3.4 Metadata Tab

No modifiable data

## 2.4 Location Properties

### 2.4.1 General Tab

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name & Type** | **Serialization Status** |
| Layer name | wstring | Serialized |
| Description | wstring | Serialized |
| Authors | wstring | Serialized |

### 2.4.2 Symbology Tab

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name & Type** | **Serialization Status** |
| *Symbol Properties* | | |
| Shape | Drop-down menu | Serialized |
| Size | Float | Serialized |
| Colour | Colour picker | Serialized |
| *Label Properties* | | |
| Label size | Integer | Serialized |
| Label position | Drop-down menu | Serialized |
| Label style | Drop-down menu | Serialized |
| Label colour | Colour picker | Serialized |
| Show | Checkbox | Serialized |

### 2.4.3 Metadata Tab

No modifiable data

## 2.5 Sequence Properties

### 2.5.1 General Tab

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name & Type** | **Serialization Status** |
| Layer name | wstring | Serialized |
| Description | wstring | Serialized |
| Authors | wstring | Serialized |

### 2.5.2 Metadata Tab

No modifiable data

## 2.6 Tree Properties Tab

### 2.6.1 General Tab

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name & Type** | **Serialization Status** |
| Layer name | wstring | Serialized |
| Description | wstring | Serialized |
| Authors | wstring | Serialized |

### 2.6.2 Symbology Tab

#### 2.6.2.1 Tree Tab

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name & Type** | **Serialization Status** |
| *Tree Layout Properties* | | |
| Layout Style | Drop-down menu | Serialized |
| Line thickness | Integer | Serialized |
| Relative height | Float | Serialized |
| 2D orientation | Modifiable Drop-down menu | Serialized |
| Optimize leaf node order | Checkbox | Serialized |
| *Tree Style Properties* | | |
| Style | Drop-down menu | Serialized |
| Default Colour | Colour picker | Serialized |
| Branch border thickness | Integer | Serialized |
| Branch border thickness [colour] | Colour picker | Serialized |
| Leaf node radius | Integer | Serialized |
| Leaf node border thickness | Integer | Serialized |
| Leaf node border thickness [colour] | Colour picker | Serialized |
| Internal node radius | Integer | Serialized |
| Internal node border thickness | Integer | Serialized |
| Internal node border thickness [colour] | Colour picker | Serialized |
| Draw layout primitive | Checkbox | Serialized |
| Draw geographic axis | Checkbox | Serialized |

#### 2.6.2.2 Connecting Lines Tab

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name & Type** | **Serialization Status** |
| *Location Line Properties* | | |
| Line style | Drop-down menu | Not serialized |
| Line thickness | Integer | Not serialized |
| Border size | Integer | Not serialized |
| Border size [colour] | Colour picker | Not serialized |
| *Correlation Line Properties* | | |
| Line style | Drop-down menu | Not serialized |
| Line thickness | Integer | Not serialized |
| Border size | Integer | Not serialized |
| Border size [colour] | Colour picker | Not serialized |
| *3D Drop Line Properties* | | |
| Line style | Drop-down menu | Not serialized |
| Line style [colour] | Colour picker | Not serialized |

#### 2.6.2.3 Geography Line Tab

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name & Type** | **Serialization Status** |
| *Geography Line Properties* | | |
| Line offset | Integer | Not serialized |
| Line style | Drop-down menu | Not serialized |
| Line thickness | Integer | Not serialized |
| *Geographic Point Properties* | | |
| Point size | Integer | Not serialized |
| Border size | Integer | Not serialized |
| Border size [colour] | Colour picker | Not serialized |
| Evenly spread geographic points | Checkbox | Not serialized |
| Draw geographic points | Checkbox | Not serialized |

### 2.6.3 Label Tab

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name & Type** | **Serialization Status** |
| *Label Properties* | | |
| Size | Integer | Not serialized |
| Colour | Colour picker | Not serialized |
| Show labels | Checkbox | Not serialized |
| *Label Position* | | |
| Position | <not yet implemented> |  |

### 2.6.4 Metadata Tab

No modifiable data

## 2.7 Menu Bar

### 2.7.1 File Menu

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **File** | **→ New Session** | Clear all session data | Not Implemented |  |
| **→ Open** |  |  |  |
| **→ Save** | Remember session filename (if exists) | Implemented |  |
| **→ Save As...** |  |  |  |
| **→ Export As Image...** |  |  |  |
| **→ Exit** | Confirm exit/save | Implemented |  |
| **View** | **→ Panes** | **→ Side Panel** | Save show/hide status | Not serialized |
| **→ Console** | Save show/hide status | Not serialized |
| **→ Widgets** | **→ Navigation Control** | Save show/hide status | Not serialized |
| **→ Overview Map** | Save show/hide status | Not serialized |
| **→ Compass** | Save show/hide status | Not serialized |
| **→ Show all** |  |  |
| **→ Hide all** |  |  |
| **→ Camera Position** | **→ Perspective (Default)** |  |  |
| **→ Top** |  |  |
| **→ Detail** | **→ Fine** | Save detail | Not serialized |
| **→ Course** |
| **Layer** | **→ Add Map** | Save Map | Implemented |  |
| **→ Add Location Set** | Save Location Set | Implemented |  |
| **→ Add Sequence Data** | Save Sequence Data | Implemented |  |
| **→ Add Tree** | Save Tree | Implemented (almost) |  |
| **→ Remove Layer** | Save layer modification | Not serialized (?) |  |
| **→ Hide All Layer** | Save show status | Not serialized |  |
| **→ Show All Layers** | Save show status | Not serialized |  |
| **Analysis** | **→ Select Sequence Dialog** | (dialog) |  |  |
| **Settings** | **→ Font Settings** | (dialog) |  |  |
| **→ Lighting Settings** | (dialog) |  |  |
| **→ Layout Object Settings** | (dialog) |  |  |
| **Help** | **→ About...** |  |  |  |

### 2.7.2 Menu Bar Dialogs

#### 2.7.2.1 Sequence Selection

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name & Type** | **Serialization Status** |
| Field | Drop-down menu | Not serialized |
| Inactive | Selection box | Not serialized |
| Active | Selection box | Not serialized |

#### 2.7.2.2 Font Properties

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name & Type** | **Serialization Status** |
| Font | Drop-down menu | Not serialized |

#### 2.7.2.3 Lighting Properties

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name & Type** | **Serialization Status** |
| *Light Direction* | | |
| Bearing | Control slider | Not serialized |
| *Light Altitude* | | |
| Altitude | Control slider | Not serialized |
| *Ambient Light Strength* | | |
| Strength | Control slider | Not serialized |

#### 2.7.2.4 Layout Object Properties

|  |  |  |
| --- | --- | --- |
| **Description** | **Variable Name & Type** | **Serialization Status** |
| *Layout Object Properties* | | |
| Thickness | Integer | Not serialized |
| Colour | Colour picker | Not serialized |
| Line style | Drop-down menu | Not serialized |
| *Layout Line Properties* | | |
| Thickness | Integer | Not serialized |
| Colour | Colour picker | Not serialized |
| Line style | Drop-down menu | Not serialized |
| *Control Point Properties* | | |
| Size | Integer | Not serialized |
| Colour | Colour picker | Not serialized |

## 2.8 Layer Controls

|  |  |  |  |
| --- | --- | --- | --- |
| **Layer Name (In loading order)** | **Source File** | **Variable Name & Type** | **Serialization Status** |
| Study |  | Visibility (on/off), Boolean | Serialized |
| Map | Map File | Visibility (on/off), Boolean | Serialized |
| Location Set | Location File | Visibility (on/off), Boolean | Serialized |
| Location | Visibility (on/off), Boolean | Serialized |
| Sequence | Sequence File | Visibility (on/off), Boolean | Serialized |
| Tree (dependencies: Map & Location Set) | Tree File | Visibility (on/off), Boolean | Serialized |

# APPENDIX A: Setting Up a Windows Development Environment

Visual Studio Quirks

# APPENDIX B: Setting Up a MacOS X Development Environment

# APPENDIX C: Basic SVN Terminal Commands

# APPENDIX D: Backing Up the GenGIS SVN

These instructions demonstrate how to perform a backup of the GenGIS SVN and transfer the resulting folder to another server (in this case MOA) for safekeeping.

Procedure:

1. Log into Kiwi (kiwi.research.cs.dal.ca)

2. Make a 'hotcopy' of the repository to another location on the same machine (e.g., home directory):

|  |
| --- |
| svnadmin hotcopy /Users/gengis/Sites/GenGIS/code/repos ~/repos-backup |

3. Copy the backup to another server (e.g., MOA):

|  |
| --- |
| scp -r ~/repos-backup *username*@moa.hpc.dal.ca:repos-backup  [the system will ask for your password] |

Determining the size of a directory at the command-line:

|  |
| --- |
| du -h <directory> |