



Quantum GIS Training Manual

Release 1.0

R. Thiede, T. Sutton, H. Düster, M. Sutton

July 04, 2014

1	Foreword	1
1.1	Background	1
1.2	License	1
1.3	Sponsoring Chapters	2
1.4	Authors	3
1.5	Individual Contributors	3
1.6	Sponsors	3
1.7	Data	3
1.8	Latest Version	3
2	Module: The Interface	5
2.1	Lesson: A Brief Introduction	5
2.2	Lesson: Adding your first layer	7
2.3	Lesson: An Overview of the Interface	8
3	Module: Creating a Basic Map	13
3.1	Lesson: Working with Vector Data	13
3.2	Lesson: Symbology	16
4	Module: Classifying Vector Data	49
4.1	Lesson: Attribute Data	49
4.2	Lesson: The Label Tool	50
4.3	Lesson: Classification	65
5	Module: Creating Maps	89
5.1	Lesson: Using Map Composer	89
5.2	Assignment 1	104
6	Module: Creating Vector Data	105
6.1	Lesson: Creating a New Vector Dataset	105
6.2	Lesson: Feature Topology	118
6.3	Lesson: Forms	135
6.4	Lesson: Actions	148
7	Module: Vector Analysis	159

7.1	Lesson: Reprojecting and Transforming Data	159
7.2	Lesson: Vector Analysis	169
7.3	Lesson: Network Analysis	187
7.4	Lesson: Spatial Statistics	201
8	Module: Rasters	221
8.1	Lesson: Working with Raster Data	221
8.2	Lesson: Changing Raster Symbology	224
8.3	Lesson: Terrain Analysis	229
9	Module: Completing the Analysis	239
9.1	Lesson: Raster to Vector Conversion	239
9.2	Lesson: Combining the Analyses	242
9.3	Assignment	244
9.4	Lesson: Supplementary Exercise	244
10	Module: Plugins	261
10.1	Lesson: Installing and Managing Plugins	261
10.2	Lesson: Useful QGIS Plugins	264
11	Module: Online Resources	277
11.1	Lesson: Web Mapping Services	277
11.2	Lesson: Web Feature Services	284
12	Module: GRASS	293
12.1	Lesson: GRASS Setup	293
12.2	Lesson: GRASS Tools	305
13	Module: Assessment	311
13.1	Create a base map	311
13.2	Analyze the data	314
13.3	Final Map	314
14	Module: PostgreSQL	315
14.1	Lesson: Introduction to Databases	315
14.2	Lesson: Implementing the Data Model	323
14.3	Lesson: Adding Data to the Model	332
14.4	Lesson: Queries	335
14.5	Lesson: Views	341
14.6	Lesson: Rules	342
15	Module: PostGIS	345
15.1	Lesson: PostGIS Setup	345
15.2	Lesson: Simple Feature Model	349
15.3	Lesson: Import and Export	356
15.4	Lesson: Spatial Queries	358
15.5	Lesson: Geometry Construction	368
16	Module: Using QGIS in animal health	377
16.1	Lesson: Putting it into practice - iSIKHNAS	377

16.2	Lesson: Projecting layers	389
16.3	Lesson: Buffering	391
16.4	Lesson: Styling to show density	399
16.5	Lesson: Joining two layers together	401
16.6	Lesson: Working with movements data	404
17	Appendix: Contributing To This Manual	413
17.1	Downloading Resources	413
17.2	Manual Format	413
17.3	Adding a Module	413
17.4	Adding a Lesson	415
17.5	Adding a Section	415
17.6	Add a Conclusion	417
17.7	Add a Further Reading Section	417
17.8	Add a What's Next Section	417
17.9	Using Markup	417
17.10	Thank You!	420
18	Answer Sheet	421
18.1	Results for <i>Adding Your First Layer</i>	421
18.2	Results for <i>An Overview of the Interface</i>	421
18.3	Results for <i>Working with Vector Data</i>	422
18.4	Results for <i>Symbology</i>	423
18.5	Results for <i>Attribute Data</i>	430
18.6	Results for <i>The Label Tool</i>	431
18.7	Results for <i>Classification</i>	435
18.8	Results for <i>Creating a New Vector Dataset</i>	436
18.9	Results for <i>Vector Analysis</i>	444
18.10	Results for <i>Raster Analysis</i>	447
18.11	Results for <i>Completing the Analysis</i>	452
18.12	Results for <i>WMS</i>	460
18.13	Results for <i>Spatial Queries</i>	464
18.14	Results for <i>Geometry Construction</i>	464
18.15	Results for <i>Simple Feature Model</i>	465
19	Indices and tables	467

Foreword

1.1 Background

In 2008 we launched the Gentle Introduction to GIS¹, a completely free, open content resource for people who want to learn about GIS without being overloaded with jargon and new terminology. It was sponsored by the South African government and has been a phenomenal success, with people all over the world writing to us to tell us how they are using the materials to run University Training Courses, teach themselves GIS and so on. The Gentle Introduction is not a software tutorial, but rather aims to be a generic text (although we used QGIS in all examples) for someone learning about GIS. There is also the QGIS manual which provides a detailed functional overview of the QGIS application. However, it is not structured as a tutorial, but rather as a reference guide. At Linfiniti Consulting CC. we frequently run training courses and have realised that a third resource is needed - one that leads the reader sequentially through learning the key aspects of QGIS in a trainer-trainee format - which prompted us to produce this work.

This training manual is intended to provide all the materials needed to run a 5 day course on QGIS, PostgreSQL and PostGIS. The course is structured with content to suit novice, intermediate and advanced users alike and has many exercises complete with annotated answers throughout the text.

1.2 License



The Free Quantum GIS Training Manual by Linfiniti Consulting CC. is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License. Based on a work at <https://github.com/qgis/QGIS-Training-Manual>. Permissions beyond the scope of this license may be available at <https://github.com/qgis/QGIS-Training-Manual/blob/master/index.rst>.

¹<http://linfiniti.com/dla>

We have published this QGIS training manual under a liberal license that allows you to freely copy, modify and redistribute this work. A complete copy of the license is available at the end of this document. In simple terms, the usage guidelines are as follows:

- You may not represent this work as your own work, or remove any authorship text or credits from this work.
- You may not redistribute this work under more restrictive permissions than those under which it was provided to you.
- If you add a substantive portion to the work and contribute it back to the project (at least one complete module) you may add your name to the end of the authors list for this document (which will appear on the front page)
- If you contribute minor changes and corrections you may add yourself to the contributors list below.
- If you translate this document in its entirety, you may add your name to the authors list in the form “Translated by Joe Blogs”.
- If you sponsor a module or lesson, you may request the author to include an acknowledgement in the beginning of each lesson contributed, e.g.:

Note: This lesson was sponsored by MegaCorp.

- If you are unsure about what you may do under this license, please contact us at office@linfiniti.com² and we will advise you if what you intend doing is acceptable.
- If you publish this work under a self publishing site such as <http://lulu.com> we request that you donate the profits to the QGIS project.
- You may not commercialise this work, except with the expressed permission of the authors. To be clear, by commercialisation we mean that you may not sell for profit, create commercial derivative works (e.g. selling content for use as articles in a magazine). The exception to this is if all the profits are given to the QGIS project. You may (and we encourage you to do so) use this work as a text book when conducting training courses, even if the course itself is commercial in nature. In other words, you are welcome to make money by running a training course that uses this work as a text book, but you may not profit off the sales of the book itself - all such profits should be contributed back to QGIS.

1.3 Sponsoring Chapters

This work is by no means a complete treatise on all the things you can do with QGIS and we encourage others to add new materials to fill any gaps. Linfiniti Consulting CC. can also create additional materials for you as a commercial service, with the understanding that all such works produced should become part of the core content and be published under the same license.

²office@linfiniti.com

1.4 Authors

- Rüdiger Thiede (rudi@linfiniti.com³) - Rudi has written the QGIS instructional materials and parts of the PostGIS materials.
- Tim Sutton (tim@linfiniti.com⁴) - Tim has overseen and guided the project and co-authored the PostgreSQL and PostGIS parts. Tim also authored the custom sphinx theme used for this manual.
- Horst Düster (horst.duester@kappasys.ch⁵) - Horst co-authored the PostgreSQL and PostGIS parts
- Marcelle Sutton (marcelle@linfiniti.com⁶) - Marcelle provided proof reading and editorial advice during the creation of this work.

1.5 Individual Contributors

Your name here!

1.6 Sponsors

- Cape Peninsula University of Technology

1.7 Data

The sample data that accompanies this resource is freely available and comes from the following sources:

- Streets and Places datasets from OpenStreetMap (<http://www.openstreetmap.org/>)
- Property boundaries (urban and rural), water bodies from NGI (<http://www.ngi.gov.za/>)
- SRTM DEM from the CGIAR-CGI (<http://srtm.csi.cgiar.org/>)

1.8 Latest Version

You can always obtain the latest version of this document by visiting our home page⁷ which is kindly hosted by <http://readthedocs.org>.

³rudi@linfiniti.com

⁴tim@linfiniti.com

⁵horst.duester@kappasys.ch

⁶marcelle@linfiniti.com

⁷<http://readthedocs.org/builds/the-free-qgis-training-manual/>

Note: There are links to PDF and epub versions of the documentation in the lower right hand corner of the above mentioned home page.

Tim Sutton, May 2012