

ORA Component Reference Manual

Jeffrey C. Reminga

August 2009
CMU-ISR-09-128

Institute for Software Research
School of Computer Science
Carnegie Mellon University
Pittsburgh, PA 15213



Center for the Computational Analysis of Social and Organizational Systems
CASOS technical report.

This work was supported in part by the Office of Naval Research under Contract No. N00014-06-1-0772, ONR, and N00014-06-10921, by the National Science Foundation IGERT in CASOS, the Air Force Office of Sponsored Research with a MURI with George Mason University under Grant No. 600322GRGMASON, and the Army Research Lab under Grant No. DAAD19-01-2-0009. Additional support was provided by the Center for Computational Analysis of Social and Organizational Systems (CASOS) at Carnegie Mellon University. The views and conclusions contained in this document are those of the author and should not be interpreted as representing the official policies, either expressed or implied, of the National Science Foundation, the Office of Naval Research, the Air Force Office of Sponsored Research, the Army Research Lab or the U.S.

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE AUG 2009		2. REPORT TYPE		3. DATES COVERED 00-00-2009 to 00-00-2009	
4. TITLE AND SUBTITLE ORA Component Reference Manual				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Carnegie Mellon University ,School of Computer Science,Pittsburgh,PA,15213				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 15	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Key Words: Dynamic Network Analysis, Component Programming, Social Networks, *ORA

Abstract

ORA is software for the analysis of network structure. The ORA components are a collection of programs that implement the features available in ORA as of the v1.9.5.4.5 (August 2009) software release.

Table of Contents

ORA Components.....	1
How To Use	1
File Types	1
Classifications	2
Component Reference.....	2
OraMain.....	3
OraMainLoadAndSelectedReports	4
Appendix I – ORA ClassPath.....	5
Appendix II – Report IDs	7

ORA Components

The ORA components are a collection of java executable programs for use in Social Network Analysis applications. These components are used by interface programs such as ORA GUI and SORASCS.

The components described in this manual are based on the ORA v1.9.5.4.5 (August 2009) software release.

How To Use

The components require Java 1.6 or higher and are callable via a command line interface. The following example shows how to call the Lowercase routine.

C:\> java -cp ORA_CP edu.cmu.casos.OraUI.controller.OraMain

ORA_CP is the class path for ORA and is contained in Appendix I, from which it can be copied.

edu.cmu.casos.OraUI.controller.OraMain is the name of the routine to run.

The ORA components are not directly callable from a Java program except to the extent to which any main() may be called. No guarantee is given to components being called in this manner.

File Types

The file types used are industry standard. This permits maximum flexibility in using the AutoMap components with other components. All components assume that files are in a standard UTF-8 file encoding.

- Text Files. The text file is for human-readable text. AutoMap components assume these files have a .txt extension.
- CSV Files. The comma separated values file is for information organized in a table. AutoMap components assume these files have a .csv extension.
- XML Files. The XML file is used for structured data, such as DyNetML used for expressing dynamic networks. AutoMap components assume these files have a .xml extension.

Classifications

The components are classified based on their usage.

- File Utility. These routines are provided as an aid in manipulation of files to prepare them for processing.
- Internal Command. An internal command is a routine that has no obvious interface to the end user.
- External Tool. An external tool is a stand-alone routine with its own user interface. The external tool is available to aid in the manipulation of supplemental files.

Component Reference

This section gives an alphabetical list of all ORA components. This list may not include routines that are used by the ORA components indirectly or routines that may be called by 3rd party libraries that ORA may make use of.

Mandatory arguments are listed in <angle brackets> with the pipe | symbol being used to identify accepted options. Optional arguments are in [square brackets]. Ellipses signify that an option may be repeated many times.

OraMain

This routine will launch the ORA GUI with no dataset. There are no parameters.

Classification: External Tool

Input File Type: N/A

Output File Type: N/A

Usage:

```
java -cp ORA_CP edu.cmu.casos.OraUI.controller.OraMain
```

Parameters:

None

OraMainLoadAndSelectedReports

This routine will launch the ORA GUI with selected datasets and with only the specified reports enabled. If no datasets are specified, then none are loaded. If no reports are specified, then all are available. Thus, if no command line arguments are provided, then this routine is the same as the OraMain routine.

Classification: External Tool

Input File Type: N/A

Output File Type: N/A

Usage:

```
java -cp ORA_CP  
edu.cmu.casos.OraUI.controller.OraMainLoadAndSelectedReports  
<dataset_filename>... <report_ID> ...
```

Parameters:

<dataset_filename>	Zero or more filenames of datasets to automatically load at startup.
<report_ID >	Zero or more reports to be available to the user at startup. If none are specified, then all reports will be available. The report IDs that can be used are listed in Appendix II.

Appendix I – ORA ClassPath

The ORA classpath is long: it is printed here so that it can copied and pasted:

```
lib/ora.jar;lib/jfreechart-1.0.13.jar;lib/jfreechart-1.0.13-  
swt.jar;lib/xercesImpl.jar;lib/TableLayout.jar;lib/jcommon-  
1.0.9.jar;lib/httpcore-nio-4.0-beta3.jar;lib/j3dcore.jar;lib/httpcore-4.0-  
beta3.jar;lib/jung.jar;lib/twitter4j-  
1.1.7.jar;lib/jcalendar.jar;lib/rssutils.jar;lib/omj3d.jar;lib/json-  
1.0.jar;lib/commons-collections-3.1.jar;lib/jsi-generics.jar;lib/opencsv-  
1.7.jar;lib/trove-2.0.4.jar;lib/xml-writer.jar;lib/commons-logging-api-  
1.1.1.jar;lib/junit.jar;lib/jts-1.7-  
generics.jar;lib/casoparser.jar;lib/jgraphlayout.jar;lib/htmlparser.jar;lib/  
facebook-util-1.8-final.jar;lib/j3d-vrml97.jar;lib/omcorba.jar;lib/ant-  
launcher.jar;lib/colt.jar;lib/wvj/worldwind-ora.jar;lib/freehep/freehep-  
graphics2d-2.0.jar;lib/gt2-2.3.3/gt2-widgets-swing-2.3.3.jar;lib/gt2-  
2.3.3/batik-svggen-1.6.jar;lib/gt2-2.3.3/spatialdb-0.1.jar;lib/gt2-  
2.3.3/velocity-1.4.jar;lib/gt2-2.3.3/gt2-go-2.3.3.jar;lib/gt2-2.3.3/jsr108-  
0.01.jar;lib/gt2-2.3.3/db2jcc_dummy-8.2.1.jar;lib/gt2-2.3.3/gt2-postgis-  
2.3.3.jar;lib/gt2-2.3.3/gt2-xml-gml3-2.3.3.jar;lib/gt2-2.3.3/gt2-xml-  
2.3.3.jar;lib/gt2-2.3.3/concurrent-1.3.4.jar;lib/gt2-2.3.3/gt2-image-  
2.3.3.jar;lib/gt2-2.3.3/jaxb-impl-1.3.jar;lib/gt2-2.3.3/gt2-tiger-  
2.3.3.jar;lib/gt2-2.3.3/imageioext-asciigrid-1.0-rc1.jar;lib/gt2-2.3.3/gt2-  
api-2.3.3.jar;lib/gt2-2.3.3/gt2-shapefile-2.3.3.jar;lib/gt2-2.3.3/gt2-main-  
2.3.3.jar;lib/gt2-2.3.3/gt2-validation-2.3.3.jar;lib/gt2-2.3.3/commons-  
jxpath-1.2.jar;lib/freehep/freehep-graphicsio-svg-2.0.jar;lib/gt2-  
2.3.3/ecore-2.1.0.jar;lib/gt2-2.3.3/postgis-driver-1.0.jar;lib/gt2-  
2.3.3/commons-beanutils-1.4.jar;lib/gt2-2.3.3/relaxngDatatype-X.jar;lib/gt2-  
2.3.3/gt2-db2-2.3.3.jar;lib/gt2-2.3.3/geowidgets-1.0-  
M1.jar;lib/jai_codec.jar;lib/freehep/freehep-graphicsio-  
2.0.jar;lib/jogl/jogl.jar;lib/freehep/freehep-io-  
2.0.1.jar;lib/freehep/freehep-xml-2.0.1.jar;lib/gt2-2.3.3/ant-optional-  
1.5.1.jar;lib/gt2-2.3.3/gt2-vpf-2.3.3.jar;lib/gt2-2.3.3/gt2-demo-property-  
2.3.3.jar;lib/gt2-2.3.3/commons-pool-1.3.jar;lib/gt2-2.3.3/jdom-  
1.0.jar;lib/gt2-2.3.3/gt2-cql-2.3.3.jar;lib/gt2-2.3.3/gt2-geoapi-nogenerics-2.1-  
M2.jar;lib/gt2-2.3.3/gt2-sde-dummy-2.3.3.jar;lib/gt2-2.3.3/vecmath-  
1.3.1.jar;lib/gt2-2.3.3/velocity-dep-1.4.jar;lib/gt2-2.3.3/gt2-coverage-  
2.3.3.jar;lib/gt2-2.3.3/batik-util-1.6.jar;lib/gt2-2.3.3/gt2-wms-  
2.3.3.jar;lib/gt2-2.3.3/jaxb-api-1.3.jar;lib/omsvg.jar;lib/gt2-2.3.3/batik-  
xml-1.6.jar;lib/gt2-2.3.3/batik-bridge-1.6.jar;lib/gt2-2.3.3/commons-lang-  
2.1.jar;lib/gt2-2.3.3/gt2-render-2.3.3.jar;lib/gt2-2.3.3/batik-dom-  
1.6.jar;lib/gt2-2.3.3/gt2-graph-2.3.3.jar;lib/gt2-2.3.3/commons-logging-  
1.0.4.jar;lib/gt2-2.3.3/gt2-epsg-hsql-2.3.3.jar;lib/gt2-2.3.3/gt2-indexed-  
shapefile-2.3.3.jar;lib/gt2-2.3.3/jlfr-1.0.jar;lib/gt2-2.3.3/gt2-hsql-  
2.3.3.jar;lib/java-getopt-1.0.13.jar;lib/gt2-2.3.3/batik-svg-dom-  
1.6.jar;lib/gt2-2.3.3/common-2.1.0.jar;lib/gt2-2.3.3/gt2-geotiff-  
2.3.3.jar;lib/toolkits_1-2-  
0.jar;lib/milStd2525_png.jar;lib/j3dutils.jar;lib/gt2-2.3.3/commons-logging-  
1.0.jar;lib/JAXWS2.1.3-20071218.jar;lib/Jama-1.0.1.jar;lib/commons-codec-  
1.3.jar;lib/gt2-2.3.3/gt2-imagemoaic-2.3.3.jar;lib/iText-  
2.1.0.jar;lib/commons-math-1.2.jar;lib/gt2-2.3.3/postgresql-8.1-  
407.jdbc3.jar;lib/freehep/freehep-util-2.0.1.jar;lib/idw-
```

1.5.0/idw.jar;lib/gt2-2.3.3/batik-awt-util-1.6.jar;lib/gt2-2.3.3/gt2-gtopo30-
2.3.3.jar;lib/gt2-2.3.3/gt2-wfs-2.3.3.jar;lib/gt2-2.3.3/picocontainer-
1.2.jar;lib/gt2-2.3.3/gt2-arcgrid-2.3.3.jar;lib/gt2-2.3.3/gt2-mysql-
2.3.3.jar;lib/gt2-2.3.3/gt2-openoffice-2.3.3.jar;lib/gt2-2.3.3/batik-ext-
1.6.jar;lib/gt2-2.3.3/gt2-oracle-spatial-2.3.3.jar;lib/gt2-2.3.3/batik-gvt-
1.6.jar;lib/gt2-2.3.3/gt2-svgsupport-2.3.3.jar;lib/gt2-2.3.3/commons-
collections-2.0.jar;lib/svgSalamander-tiny.jar;lib/jhall.jar;lib/gt2-
2.3.3/batik-css-1.6.jar;lib/gt2-2.3.3/gt2-mappane-2.3.3.jar;lib/gt2-
2.3.3/gt2-demo-mappane-2.3.3.jar;lib/gt2-2.3.3/gt2-directory-
2.3.3.jar;lib/gt2-2.3.3/gt2-geomedia-
2.3.3.jar;lib/activation.jar;lib/commons-logging-1.1.1.jar;lib/gt2-2.3.3/gt2-
mif-2.3.3.jar;lib/openmap.jar;lib/gt2-2.3.3/gt2-xml-filter-
2.3.3.jar;lib/httpmime-4.0-beta2.jar;lib/gt2-2.3.3/junit-
3.8.1.jar;lib/jai_core.jar;lib/gt2-2.3.3/xml-apis-
1.0.b2.jar;lib/mail.jar;lib/gt2-2.3.3/hsqldb-1.8.0.1.jar;lib/jogl/gluegen-
rt.jar;lib/gt2-2.3.3/commons-cli-2.0-gt2-pre1.jar;lib/gt2-2.3.3/commons-io-
1.2.jar;lib/gt2-2.3.3/xsd-2.1.1.jar;lib/gt2-2.3.3/gt2-demo-data-
2.3.3.jar;lib/gt2-2.3.3/batik-transcoder-1.6.jar;lib/javaml-
0.0.12.jar;lib/gt2-2.3.3/gt2-epsg-access-2.3.3.jar;lib/gt2-2.3.3/jta-
1.0.1B.jar;lib/gt2-2.3.3/gt2-epsg-postgresql-2.3.3.jar;lib/gt2-2.3.3/gt2-
referencing-2.3.3.jar;lib/freehep/freehep-graphicsio-pdf-2.0.jar;lib/gt2-
2.3.3/gt2-brewer-2.3.3.jar;lib/gt2-2.3.3/xercesImpl-2.7.1.jar;lib/commons-
httpclient-3.1.jar;lib/gt2-2.3.3/imageioext-customstreams-1.0-
rc1.jar;lib/gt2-2.3.3/jdbc-stdext-2.0.jar;lib/httpclient-4.0-
beta2.jar;lib/gt2-2.3.3/jdom-b9.jar;lib/gt2-2.3.3/jaxb-libs-1.3.jar;lib/gt2-
2.3.3/gt2-imagepyramid-2.3.3.jar;lib/gt2-2.3.3/batik-script-1.6.jar;lib/gt2-
2.3.3/xsdlib-20050614.jar;lib/facebook-java-api-1.8-final.jar;lib/gt2-
2.3.3/gt2-arcsde-2.3.3.jar;lib/gt2-2.3.3/gt2-coverageTools-
2.3.3.jar;lib/MDateSelector14-00347.jar;lib/rome-1.0.jar;lib/gt2-2.3.3/gt2-
shapefile-renderer-2.3.3.jar;lib/gt2-2.3.3/gt2-epsg-wkt-2.3.3.jar;lib/gt2-
2.3.3/gt2-gml-2.3.3.jar;lib/gt2-2.3.3/log4j-1.2.6.jar;lib/gt2-2.3.3/xml-apis-
xerces-2.7.1.jar;lib/gt2-2.3.3/batik-parser-1.6.jar;lib/gt2-2.3.3/gt2-xml-
gml2-2.3.3.jar;lib/gt2-2.3.3/gt2-referencing3D-2.3.3.jar;lib/jdom.jar

Appendix II – Report IDs

Below are listed the report IDs that uniquely identify the reports in ORA. They are used as input parameters to various routines.

Report ID	Report Title (used in GUI)	Description
riskCategories	All Measures	Computes a collection of measures and generates output in categories. Each category analyzes a particular aspect of the meta-network structure.
beliefPropagation	Belief Propagation	Estimates belief propagation through social networks
cpof	CPOF	Analyzes the creation and modification of events and tasks and agent collaboration over time.
capabilities	Capabilities	Analyzes the knowledge, resource, and task capabilities of agents and organizations in the network.
keyChange	Change in Key Entities	Analyzes the changes over time of the agents that score highest in measure values.
communicationAssessment	Communications Network Assessment	This report assesses a communications network. As information on speed of information transmittal becomes available it will be updated. This report takes a resource by resource network (preferably one where the nodes are communications devices and the links are the speed or reliability of the link).
communicativePower	Communicative Power	Analyzes one or more semantic networks to classify concepts by measure values.
communicators	Communicators	Analyzes the communication network (agent by agent) and gives high level statistics on its structure.
context	Context	Compares measured values against various stylized forms of networks in an effort to characterize network topology.
coreNetwork	Core Network	Computes the core network and reports general statistics.
criticalSets	Critical Sets	Finds critical sets of nodes in a network that best reach all other nodes, or whose removal maximally disrupts a network.
custom	Custom	Computes a custom report with user selected measures and output tables,

		pictures, and figures.
drillDown	Drill Down	Computes the drill down from a selected organization and then to a selected agent.
geospatialAssessment	Geospatial Assessment	Finds nodes that are co-located based, and counts the number of nodes that appear at location pairs.
groupTalk	Group Talk	Analyzes the relationship between agents and knowledge.
contentAnalysis	Hot Topics (Content Analysis)	Analyzes semantic network output from AutoMap.
immediateImpact	Immediate Impact	Computes the key actors of the network, and then isolates them individually to determine the effect on measure values.
influenceNetwork	Influence Net	Displays the influence network and gives high level statistics on its structure.
intelligence	Key Entity	Identifies key entities and groups who by virtue of their position in the network are critical to its operation.
list	Large Scale	Computes all network analysis measures.
localPatterns	Local Patterns	Find link patterns in a network, such as Star, Checkerboard, and Clique.
subGroup	Locate SubGroups	Identifies the subgroups present in the network using various grouping algorithms.
management	Management	Identifies over- and under-performing individuals and assesses the state of the network as a functioning organization.
merchantMarineVessel	Merchant Marine	Analyzes the relationships between crew members, owners, vessels and locations of the Merchant Marine Vessel data.
missingLinks	Missing Links	Compute possible missing links in a network.
optimizer	Optimizer	Adapt the link structure of a meta-network to maximize or minimize selected measure values.
partOfSpeech	Part Of Speech	Describe the distribution of concepts by part of speech in one or more networks.
potentialErrors	Potential Errors	Detects potential errors in agent to agent interactions based on the expected interactions from cognitive similarity and expertise.
health	Public Health	Analyzes health department data to find

		potential problems.
qap	QAP/MRQAP Analysis	Computes QAP and MRQAP Correlation and Regression (Dekker and Y-Permutation methods) on input networks.
semanticNetwork	Semantic Network	Analyzes one or more semantic networks, computing the central networks and key concepts and links.
shortestPath	Shortest Path	Computes the shortest path between two entities and general statistics on the paths. The sphere of influence of each entity is also computed.
simmelianTies	Simmelian Ties Analysis	Calculates the number of Asymmetric, Sole-Symmetric, and Simmelian ties in unimodal networks computes standard measures on them.
egoNetwork	Sphere of Influence	For each individual, identifies the set of actors, groups, knowledge, resources, etc. that influence and are influenced by that actor.
sna	Standard Network Analysis	Calculates the standard network analysis measures (degree centrality, betweenness centrality, etc).
statisticalNetworkMonitoring	Statistical Change Detection	Analyzes the changes in network-level measures over time using a Statistical Process Monitoring (SPM) control chart. Control limits are determined based on a user defined level of risk.
statisticalDistribution	Statistical Distribution	Fits statistical distributions to a network based on measure values.
tavi	TAVI	This report analyzes the Rendezvous and Threat event data from the TAVI project.
tacticalInsight	Tactical Insight	Analyzes the top agent nodes across time periods, tracking locations and measure values.
trails	Trails	Analyzes the trails that an entity class makes through another entity class, for example, how vessels pass through ports.
uniqueTrails	Unique Trails Report	Analyzes the path of an entity class through locations over time.