Installation and Testing How-To

This document provides basic information about how to install and run TRANSIMS programs on Windows and Linux computer systems.

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1.0   Things to Know about TRANSIMS

The information in this section applies to all TRANSIMS installations and will be useful in understanding terms used in this and other how-to documents.

1.1   Versions of TRANSIMS

The core TRANSIMS technology includes an array of console-based programs. A console-based program runs in a terminal window (i.e., TRANSIMS does not include a graphical user interface, or GUI). To execute the program, the user typically types the name of the program at the command prompt followed by an application control file. The program provides text messages about its execution status to the screen and to an output report file. At the end of the execution the output files specified in the input control file will have been generated.

The console-based approach enables TRANSIMS developers to focus on computational tasks rather than the GUI development. It also makes it relatively easy to compile TRANSIMS programs for a variety of operating systems.

The TRANSIMS software can be downloaded from
http://sourceforge.net/projects/transims/files/ → software

The latest source code of the software can be downloaded from the Subversion repository of the http://sourceforge.net website. For more information point your browser to the http://sourceforge.net website, locate the page of the TRANSIMS project by searching for TRANSIMS in the search box, select the "Code" tab and then click on "SVN" which is an abbreviation of the Subversion control system.

This series of how-to documents is focused on TRANSIMS Version 4. Version 4 programs and source code were made available on the web starting in July 2006. Documents, programs, and source code available prior to July 2006 focus on TRANSIMS Version 3. Most Version 3 data files will work with Version 4 software. Conversion utilities are available for those data formats that have changed.

1.2   Application Control Files

File names, parameters, and options are passed to a TRANSIMS program through a program control file. The name of the control file can be either included after the program name on the command line or entered at the control file prompt once the program is executed.

A control file is a text file containing control keys and corresponding parameters. A subset of the TransimsNet.ctl control file located in the control directory is shown below:

```
TITLE                             Create Alexandria Highway Network
DEFAULT_FILE_FORMAT               TAB_DELIMITED

#---- Input Files ----

NET_DIRECTORY                     ../network
NET_NODE_TABLE                    Input_Node.txt
NET_LINK_TABLE                    Input_Link.txt

NET_SHAPE_TABLE                   Input_Shape.txt
NET_ZONE_TABLE                    Input_Zone.txt

#---- Output Files ----

NEW_DIRECTORY                     ../network
NEW_NODE_TABLE                    Node
NEW_LINK_TABLE                    Link
NEW_SHAPE_TABLE                   Shape
NEW_ACTIVITY_LOCATION_TABLE       Activity_Location
NEW_PARKING_TABLE                 Parking
NEW_PROCESS_LINK_TABLE            Process_Link
NEW_POCKET_LANE_TABLE             Pocket_Lane
NEW_LANE_CONNECTIVITY_TABLE       Lane_Connectivity
NEW_UNSIGNALIZED_NODE_TABLE       Sign_Warrants
```

```
NEW_SIGNALIZED_NODE_TABLE          Signal_Warrants
LINK_NODE_EQUIVALENCE              Link_Node

#---- Parameters -----

POCKET_LENGTHS_FOR_FACILITY_1      100, 150, 150, 150, 300, 350, 400, 500
POCKET_LENGTHS_FOR_FACILITY_2      60, 75, 75, 75, 150, 200, 250, 300
```

In general, the order of the control keys in the file is not important, except when the same key is listed multiple times. In such cases, the last instance of that key will be used by the program. The control keys must appear in upper case letters, and they are the first value on each line. A space or tab is used to separate the key from the parameters that follow. The parameters must be listed on the same line as the control key.

If a program will accept multiple instances of a given control key, the key will end with a number (e.g., POCKET_LENGTHS_FOR_FACILITY_1, POCKET_LENGTHS_FOR_FACILITY_2). In such cases, any number of keys can be provided, and the key numbers do not need to be sequential or contiguous. To enable the user to create a master control file for a series of programs, the control file can include comment statements using the # symbol, as well as control keys that are not required by a specific program.

The list of control keys used by each program is provided in the program documentation, which is available on the web. Point your browser to http://sourceforge.net/projects/transims/files/ → documentation and download the user manuals, how-to documents, and quick reference guides.

1.3   Application Report Files

All TRANSIMS programs automatically generate a report or printout file each time the program is executed. The printout file name is based on the name of the control file, with the control file's three-character extension replaced by "prn" (e.g., the control file *.ctl will generate a printout file named *.prn). The printout file will be created in the same directory as the control file, and it will overwrite an existing file with the same name.

All TRANSIMS programs include two control keys that enable the user to override the default behavior described above. The REPORT_FILE key can be used to specify a different path and file name. The REPORT_FLAG key defines how the file is opened. If the value of this key is "yes" or "true," the report file or printout file will be opened in append mode rather than create mode. This permits the user to consolidate the output of several programs into a single report file.

Report files are text files with page formatting characters. The TITLE key permits the user to customize the message that is printed at the top of each page. The title is followed by the date, time, program name, and page number. In most programs, the page has a maximum of 65 lines, and each line is limited to 95 characters.

1.4   Project Directories

TRANSIMS applications are typically run from a project directory. All TRANSIMS programs include a `PROJECT_DIRECTORY` key to facilitate access to data files within a given project. A project directory may represent a region, an analysis year, or an alternative, and the name should sufficiently describe the application. The path to the project directory should not include spaces. For example, a path such as:

> c:\My Documents\Project XYZ   (Windows)
> /home/project data/Project XYZ   (Linux)

will not work properly within the TRANSIMS control file interface, because of the spaces in the path. A suitable directory name would utilize underscore characters for spaces and be similar to:

> c:\TRANSIMS\Project_XYZ   (Windows)
> /home/project_data/Project_XYZ   (Linux)

It is typical for TRANSIMS applications to include a number of subdirectories within each project directory. A consistent set of subdirectory names will make it easier to organize the data files and prepare batch processing procedures.

A subdirectory like the following scheme will be used in the series of how-to documents:

> activity
> batch
> control
> household
> network
> plans
> results
> skims
> survey
> trips
> vehicle

The control directory includes the control files for each program and the printouts from each run. This is also where the batch files are stored for running a series of programs.

The batch directory is used to store user scripts that implement various model algorithms.

The network directory contains the network data tables plus the traffic counts and equivalence files used by the summary and evaluation tools. The network directory also includes a subdirectory called arcview, in which the ArcView shapefile representation of the network is stored.

The trips directory includes user-provided trip tables. For trip-based methods, the activity, household, and vehicle directories store the synthetically generated trips, household and population data, and household vehicles.

For activity-based methods, the household, survey, and skims directories contain the input data for the population synthesis and activity generation procedures. The output of these procedures is stored in the activity, household, and vehicle directories.

The plans directory stores the travel plans generated by the routing process. The results directory includes the output results from the microsimulation, as well as problem files from other programs.

1.5   Data Files and Formats

TRANSIMS input and output files are typically tab-delimited text files. Most files include a header record that lists the field names. In TRANSIMS Version 3, the number of fields, as well as the position of each field, was rigidly defined. Version 4 is more flexible with regard to the field names, number of fields, and field positions. It also permits the files to be in various file formats: tab delimited, space delimited, comma delimited, fixed column, dBase, and binary.

The additional file format flexibility provided in Version 4 is implemented using definition files. A definition file is a comma-delimited text file that identifies the file format, number of header records, and the name, type, size, and position of each field in the file. The name of the definition file is the name of the corresponding data file followed by ".def" (i.e., *.def). These files are automatically created and managed by the TRANSIMS application.

By default, TRANSIMS Version 4 reads and creates files in Version 3 format. The user can override this behavior by entering a FORMAT key for a given file key. For example, if the program creates a `PLAN_FILE`, it will also include a `PLAN_FORMAT` key to enable the user to override the default file format.

For input files, the program will first look for a definition file based on the input file name. If a definition file does not exist, it will look for a FORMAT key to identify the file format. If a FORMAT key is not provided, it will assume the file is a delimited text file and attempt to construct a definition file from the header and first few records of the file. This definition file is saved and used by subsequent applications that open the file.

2.0   Windows Installation and Testing

This section describes how to install and test TRANSIMS executable programs on the Microsoft Windows operating system. Users should have access to the Internet, to a text editor, and to a zip file utility (such as WinZip or Windows XP).

2.1   Technical Requirements

The Windows version of the TRANSIMS software is compiled for a generic 32-bit Windows operating system (e.g., Windows 95, Windows 98, Windows NT 4.0, Windows 2000, and Windows XP). The 64-bit software must be executed on an x64-based computer with an operating system like Windows XP64.

To allow the user to modify the TRANSIMS source code and recompile the programs as desired, the project files for Microsoft Visual Studio 2005 are included with the source code. Alternative compilers such as gcc can also be used. The code is written in ANSI C++ with a few Microsoft extensions. These extensions are disabled if other compilers are used.

2.2   Software Installation

Begin by creating a directory (folder) on your computer or local area network. For example, create a directory called

        c:\TRANSIMS\bin

Then go http://sourceforge.net/projects/transims/files/ and navigate to software. Versions 4.0.01 through 4.0.06.01 are available for download. The 32-bit or 64-bit windows executables are listed and attached as zip files.

If you wish to avoid having to type the path to the software directory every time you run a TRANSIMS program, you should update the path environment variable in the Windows operating system. In Windows XP, open the "My Computer" interface, right-click on the window, and select "Properties." This will bring up the "System Properties" window. Select the "Advanced" tab and then the "Environment Variables" button. Scroll down the "System variables" until you see "Path." Double click "Path" and add the TRANSIMS path to the "variable value." For example, if the current path variable is "xxx," you can add the TRANSIMS directory by typing:

        xxx;c:\TRANSIMS\bin

After you have completed the download and installation of the executable files, download the software documentation and the case study data to test the installation. To download the test data to your computer or local area network, select
http://sourceforge.net/projects/transims/files/ → test data → 4.0.3a Test Cases

Save the zip files (Alexandria_4.0.3a.zip and TestNet_4.0.3a.zip) in the TRANSIMS directory you created on your hard disk. Use WinZip or the built –in facility of Windows XP to open the file and extract the directory structure and data files to the TRANSIMS directory.

2.3   How to Run a Program

TRANSIMS programs are run from the command line in a command prompt window or through batch files or shortcuts from Windows Explorer.

Command Line Method

To apply the command line method, go to the Start menu and select "Run." Type "cmd" in the box that appears. This will open the command prompt window. Use the MS-DOS change directory commands to move to the "control" directory within the project of interest. For example, enter

    cd \TRANSIMS\Alexandria\control

at the command prompt. If the PATH environment variable was set, you can run a TRANSIMS program by typing the program name followed by the control file name. For example,

    TransimsNet TransimsNet.ctl

Otherwise, the path to the directory with the executable files will need to be added to the command line. For example,

    c:\TRANSIMS\bin\TransimsNet TransimsNet.ctl

In either case, the program will run, and progress information will appear in the command window. If the process ran successfully, "Process Complete" will appear in the window, followed by the command prompt. If the program identified an error, it will display the error message and ask you to press any key to continue (i.e., you must press a key on the keyboard before the command prompt will appear).

Batch File Method

The batch file and shortcut methods produce the same command window behavior, but initiate the execution from a standard Windows interface. Both methods require the user to prepare a file that facilitates the execution.

The batch file method uses a simple text file that includes the execution command and has the "bat" file extension (i.e., *.bat). For example, the TransimsNet.bat file included in the batch directory contains the following text:

    c:\TRANSIMS\bin\TransimsNet TransimsNet.ctl

If the TransimsNet.ctl file is not in the same directory as the batch file, the full path to the control file must be included in the batch command.

The TransimsNet application can then be launched by double clicking the TransimsNet.bat file in Windows Explorer. The batch process will open the command window, execute the program as before, and exit the command window if the process is successful. If an error message is generated, the command window will remain open until the user presses a key on the keyboard. The report file (TransimsNet.prn) contains information about the run.

Shortcut Method

The shortcut method is similar to creating a batch file. In this approach the user right-clicks on the TransmsNet.ctl file in Windows Explorer and selects the "Create Shortcut" command. A file called "shortcut to TransimsNet.ctl" is created. Right click this file and select "Properties." Edit the target text to include the path to the TransimsNet program in front of the control file name. For example, target text such as

> c:\TRANSIMS\Alexandria\control\TransimsNet.ctl

should be changed to

> c:\TRANSIMS\bin\TransimsNet TransimsNet.ctl

Note that the path to TransimsNet.ctl is no longer needed as long as the "Start in" field contains the path to the TransimsNet control file.

The TransimsNet program can then be executed by double clicking the shortcut filename.

2.4 Troubleshooting

The program did not run:
>   Check to ensure that the batch file, shortcut, or command prompt includes the correct path to the TRANSIMS executable program.

Error opening control or data files:
>   Verify that the shortcut starts in the correct directory.
>   Make sure that the control file includes the correct path to the project or network directory.
>   Close the control file if it is currently opened for editing in Word, Excel, or other program.

The path to a file shown in an error message is incomplete:
>   Check to ensure that the directory and file names do not include any spaces.
>   Check that the path includes a project or network directory key.

The program ignored a key included in the control file:
>   Make sure the key is capitalized and spelled correctly,

Review the control file to ensure there is not another key with the same name further down in the file.

2.5 Frequently Asked Questions

Do the TRANSIMS executables and project files need to be installed in a specific place or directory?

No. The software can be installed in any directory on a hard disk or network drive. Windows needs to know the path to the executable program, and the TRANSIMS programs need to know the paths to the data files.

Is there any benefit in keeping all of the project files in a specific directory?

Yes. The TRANSIMS programs include root directory keys for the network and project files. If all files can be located using these keys, it is possible to make the control files less dependent on file paths. This makes it relatively easy to copy the control and data files to other project directories or computers, with minimal impact on their functionality.

3.0 Linux Installation and Testing

This section describes how to install and test TRANSIMS executable programs on the Linux operating system. The user should have a very basic knowledge of Linux and should be familiar with some elementary command line commands.

3.1 Technical Requirements

A Linux version of the TRANSIMS software has not been pre-compiled. The Linux version of the source code is distributed in the form of a source tarball (*.tgz). To download the tarball navigate to http://sourceforge.net/projects/transims/files/ → software and download the tarball zip file (with the *.tar.gz file extension). A 'README' file is included in the zip file which provides instruction on how to configure and compile the source code to create TRANSIMS binaries for execution on Linux operating systems.

If you wish to modify the TRANSIMS source code and recompile the programs, the script file Compile.pl is provided for this purpose. Since the TRANSIMS code is written in ANSI C++, older or other compilers could be used as well.

3.2 Software Installation
Begin by creating a directory on your computer or local area network and name the file

/home/TRANSIMS/bin

In order to create this directory, you will have to log in as superuser. Type

        su

and then enter the superuser's password.

Create the directory by typing the following commands at the Linux command prompt.

        cd /home
        mkdir TRANSIMS
        cd TRANSIMS
        mkdir bin

Only the superuser is able to modify the TRANSIMS folder. To give write permissions to any other user, type the following:

        cd /home
        chmod –R 777 TRANSIMS

Now login as a regular user by typing

        su *username*

and providing your password at the prompt.

Then move to the TRANSIMS program directory by typing

        cd /home/TRANSIMS/bin

The TRANSIMS software and documentation can be downloaded from http://sourceforge.net/projects/transims/files/. Select the tarball zip file and save the file to the "/home/TRANSIMS/bin" folder you just created. Use the Linux utility "unzip" to open the zip file and extract the executable programs.

        unzip Linux32.zip
        chmod 777 *.*

The last command enables every user to run the TRANSIMS programs. To test if you have successfully changed the permissions, type:

        ./TransimsNet

You should then be able to see the TransimsNet program logo. Press Enter to stop its execution.

Unless your working directory is the program directory, you should use the full or the relative pathname to execute a TRANSIMS program. For example if you are in the /home/ directory, you would type:

./TRANSIMS/bin/TransimsNet

Again, press Enter to terminate the program's execution.

Alternatively, you can enable Linux to automatically find the TRANSIMS programs without typing their full path by updating the PATH environment variable of the ".bash_profile" file using a text editor such as Vim. For example, change to your user root directory and edit your profile using the following commands:

cd $HOME
vim .bash_profile

This should open your profile for editing. If the current PATH variable is "xxx," you can add the TRANSIMS program directory by updating its value to be:

xxx:home/TRANSIMS/bin/

Save the change. In order for the change to take effect you should log out and then log in again. After doing so, you should be able to run any executable file by typing its name on the command line.

After you have completed the download and installation of the executable files, download the software documentation and test case study to test the installation. To download the data to your computer or local area network, select
http://sourceforge.net/projects/transims/files/ → test data → 4.0.3a Test Cases

ave the zip files (Alexandria_4.0.3a.zip and TestNet_4.0.3a.zip) in the TRANSIMS directory you created on your hard disk. Use "unzip" Linux utility to open the file and extract the directory structure and data files to the TRANSIMS directory.

3.3   How to Run a Program

TRANSIMS programs are run from the command line or through batch files.

Command Line Method

To apply the command line method use the Linux change directory commands to change to the "control" directory for your project. For example, enter

cd /home/TRANISMS/Alexandria/control

at the command prompt. If the path environmental variable was set you can run a TRANSIMS program by typing the program name followed by the control file name. For example,

TransimsNet TransimsNet.ctl

Otherwise, the path to the directory with the executable files will need to be added to the command line. For example,

/home/TRANSIMS/bin/TransimsNet TransimsNet.ctl

In either case, the program will run, and progress information will be displayed in the command window. If the process ran successfully, the program will display "Process Complete" and return control to the command prompt. If the program identified an error, it will display the error message and ask you to press any key to continue (i.e., you must press a key on the keyboard to return to the command prompt).

Batch File Method

The batch file method produces the same command window behavior, but requires the user to prepare a file that facilitates the execution.

The batch file method uses a simple text file that includes the execution command. We suggest having a *.run extension to identify its functionality. For example, the TransimsNet.run file included in the control directory contains the following text:

/home/TRANSIMS/bin/TransimsNet TransimsNet.ctl

If the TransimsNet.ctl file is not in the same path as the batch file, the full path to the control file should be included in the batch command.

The TransimsNet application can then be launched by executing the TransimsNet.run file. For example, if you type

./TransimsNet.run

at the command line, the batch process executes the program as before and exits the program if the process is successful. If an error message is generated, the program will remain active until the user presses a key on the keyboard. In either case, the report file (TransimsNet.prn) contains information about the run.

3.4   Troubleshooting

The program did not run:
Does the shell script or command prompt include the correct path to the TRANSIMS executable program?

Did you proceed the file name with the "./" command?
Does the executable file have execute permission?

Error opening control or data files:
Does the shell script start in the correct directory?
Does the control file include the correct path to the project or network directory?
Do the directories or file names have correct upper and lower case characters?
Did you use forward slash "/" directory symbols?
Do you have read and write permissions for the files and directories?

The path to a file shown in an error message is incomplete:
Does the directory or file name include a space?
Did you forget to include a project or network directory key?

The program ignored a key included in the control file:
Is the key spelled correctly and in upper case characters?
Is there another key with the same name further down in the control file?

3.5 Frequently Asked Questions

Do the TRANSIMS executables and project files need to be installed in a specific place or directory?

No. The software can be installed in any directory, hard disk, or network drive. Linux needs to know the path to the executable program, and the TRANSIMS programs need to know the paths to the data files. The user needs access permission to these locations and must have write permissions to the output directories.

Is there any benefit in keeping all of the project files in a specific directory?

Yes. The TRANSIMS programs include root directory keys for the network and project files. If all files can be located using these keys, it is possible to make the control files less dependent on file paths. This makes it relatively easy to copy the control and data files between project directories or computers with minimal impact on their functionality.