

**Installing and Using
the Executable-Image Version of GEMPACK
on Linux PCs**

GEMPACK Document No. GPD-10

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This is part of the documentation of the GEMPACK Software System for solving large economic models, developed by the IMPACT Project, Monash University, Clayton Vic 3800, Australia.

Abstract

PC computers provide excellent platforms for doing serious general equilibrium modelling. This document describes how to install and use the Executable-Image Version of GEMPACK on a Linux PC. This document also describes how to install the GEMPACK program GEMView and the electronic version of the GEMPACK documentation.

The Executable-Image Version allows the full range of modelling tasks (building new models or modifying existing models). Normally models are limited to those that can be implemented and solved within about 32 megabytes of memory. This is large enough for many medium-sized models but not sufficient for large models.

Authors and Earlier Editions

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CHAPTER 1

1. The Executable-Image Version of GEMPACK

GEMPACK runs essentially unchanged on a variety of machines. This document tells you how to install the Executable-Image Version of GEMPACK on a PC (usually a Pentium) running Linux. This document describes

1. how to install and use the Executable-Image version of GEMPACK,
2. how to install and use GEMView, the graphical interface program for viewing GEMPACK Header Array files and Solution files,
3. how to install electronic versions of the GEMPACK documentation.

The Executable-Image version of GEMPACK can be used to build new models or modify existing models. Normally models are limited to those which can be implemented and solved within about 32 megabytes of memory (even when the computer on which the software is installed has more than this amount of memory).¹ This includes many medium-sized models, but excludes large models such as ORANI or MONASH at the usual disaggregation of 100 or more sectors and many intertemporal models. Precise details of the size of models that can be handled are given in section 6.2.1 below.

The user documentation for GEMPACK can be found in the other GEMPACK documents, of which GPD-1² *Introduction to GEMPACK* should be your starting point. You can carry out the installation and testing described below without being familiar with GEMPACK. But if you intend to use GEMPACK for modelling, we recommend you at least quickly read Chapters 1 to 3 in GPD-1 before attempting any modelling on your PC (and perhaps before you install GEMPACK on your PC).

An introduction to the different GEMPACK programs can be found in section 1.1 of GPD-1, while a guide to the models supplied with GEMPACK (including the Executable-Image version) is given in section 1.3 of GPD-1. A guide to the full user documentation for GEMPACK can be found in chapter 5 of GPD-1. Hands-on examples for GEMPACK can be found in chapter 3 of GPD-8.

1.1.1 Installing the Demonstration version of GEMPACK

To install the Demonstration version instead of the Executable-Image version, replace the files for the Executable-image with the corresponding files for the Demonstration version, but follow the same instructions. For example, replace the file `gempackei-1.0.1-8.i386.rpm` by `gempackdm-1.0.1-8.i386.rpm`. Install GEMView, the graphical interface program for viewing GEMPACK Header Array files and Solution files, and install electronic versions of the GEMPACK documentation exactly as described below.

¹ These limits do not apply if you have an Unlimited Executable-Image GEMPACK licence (see section 1.2 of GPD-1).

² References to GEMPACK documents identify the document by GEMPACK Document (GPD) number, rather than by author or date. References are always to the version of the document which is current at the date of issue of the cross-referencing document. The GEMPACK documents referenced are listed in a separate section at the end of the References section of this document.

1.2 GEMPACK Programs Supplied with the Executable-Image Version

The GEMPACK programs included with the Executable-Image Version of GEMPACK are:

| | |
|--------|---|
| TABLO | for processing the description of your model |
| GEMSIM | for carrying out simulations with your model |
| GEMPIE | for printing simulation results |
| SAGEM | for carrying out Johansen simulations |
| MODHAR | for building or modifying data files |
| SEEHAR | for looking at data files |
| SLTOHT | for converting simulation results to other forms |
| MKHAR | for moving data files between different computers |
| RWHAR | for moving data files between different computers |
| SUMEQ | for obtaining information about Equations files |
| SEENV | for obtaining information about Environment files |
| CMPHAR | for comparing data on two Header Array files |
| ACCUM | for side-joining solutions for spreadsheet programs |
| DEVIA | for preparing deviations between solutions for spreadsheets |
| RWSOL | for moving Solution files between different computers |
| MKSOL | for moving Solution files between different computers |
| TEXTBI | for recovering text files from binary files |
| CMBHAR | for combining several Header Array files. |

There is also the graphical interface program:

| | |
|---------|--|
| GEMView | for viewing your data files and Solution files |
|---------|--|

1.3 Models Supplied with the Executable-Image Version

All the models usually supplied with source-code version of GEMPACK are supplied with the Executable-Image Version of GEMPACK. The models currently supplied are those listed in chapter 1 of GPD-8.

The models currently supplied include Stylized Johansen, Miniature ORANI, TRADMOD, ORANIG, ORANI-F, GTAP, DMR, TREES, CRTS and 5SECT. These can all be solved in 32 megabytes of memory.

1.4 Current Release

The current version of GEMPACK is Release 8.0 (October 2002).

1.5 Contacting the Centre of Policy Studies / Impact Project

For more information about GEMPACK, contact

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Fax: (03)-9905-2426 or +61-3-9905-2426 from overseas

Information can be obtained from the GEMPACK Web site:

<http://www.monash.edu.au/policy/gempack.htm>

CHAPTER 2

2. System Requirements for the Executable-Image Version

2.1 Summary

1. A Pentium or similar equivalent computer.
2. A compatible version of the Linux operating system. This version of GEMPACK has been tested on the following Linux versions. Other Linux variants might be compatible if they include kernel version 2.2.10 or later and libc version 2.2 or later.
 - Red Hat Linux Version 7
 - Mandrake 8.0
3. Hard disk, requiring at least 60Mb free to install GEMPACK. (You will need more disk space to run models.)
4. At least 32MB of memory (RAM).

If your computer easily satisfies the above requirements, you can omit the next section and go on to chapter 3.

2.2 Disk Space Free

You can determine how much disk space is free by entering the shell command: **df**
Implementing your own models takes more disk space. The larger the model, the more space you will need.

2.3 Memory Required

The amount of extended memory you have limits the size of models you can build. Our experience is that many models that are being built now can be implemented with 32 MB of RAM (although more is required to implement very large models such as ORANI and its extensions, or large intertemporal models).

CHAPTER 3

3. Installation Instructions

The Executable-Image Version of GEMPACK is supplied as several rpm files by FTP or on a CD. Alternatively the Executable-Image can be installed from a compressed archive using an installation shell script.

The components to install are:

- the Executable-Image version of GEMPACK.
This involves installing the executable images of the different GEMPACK programs (as listed in section 1.2) to the hard disk of your computer. These are the programs you use to solve and modify models.
- Files from the licence diskette. Your GEMPACK licence is usually supplied on a 1.44 Mb floppy disk or by email. Copy your licence file to the directory in which the Executable-Image files are installed.
- GEMView, the graphical viewer for GEMPACK data and Solution files
- electronic versions of the GEMPACK user documentation.
You can read or print this GEMPACK documentation using the Adobe Acrobat Reader.

3.1 Installing the GEMPACK Executable-Image and GEMView

The Executable-Image Version of GEMPACK and GEMView are supplied by FTP or on a CD. There are three ways of installing GEMPACK:

1. Using the graphical front-end to the RPM Package Manager³ from Red hat, Inc.
or
2. Using the shell command **rpm** to the RPM Package Manager
or
3. From a compressed archive (tar file tar.gz) using a shell script.

Choose method 1 if you are familiar with the graphical front-end for RPM. Method 1 does not allow you to choose the installation directory but just places files in standard locations. Method 1 is probably the simplest method if you are familiar with RPM installation. However you need to know where to place RPM files for your version of Linux. The permissions and environment variables needed for GEMPACK are added automatically to your system.

Choose method 2 if you are not familiar with the graphical front-end of RPM or if you want to run the rpm command as a shell command or if you want to install in a different directory from the default directory.

Choose method 3 if you do not have RPM on your computer or if you like to see and control in detail the changes to your system. This carries out the installation in simple steps using a shell script.

³ RPM is used to install, uninstall, upgrade, verify and build software packages. RPM creates an archive of files and application information (including a name, version and brief description). It is available on many versions of Linux and UNIX and is widely used for software distribution.

Become the Super User

To install GEMPACK using RPM, you will need super user (root) privileges. Because installation makes changes to your system, for most functions you must be root in order to use RPM from either the graphical front end or from the shell prompt.

For method 1, log in as root.

For methods 2 or 3, either login as root or open a shell on your computer and use the **su** command. The **su** command (and root password) enables you to switch to super user mode.

For method 3 you can install GEMPACK **without super user privileges** only if you install within a directory where you have full **rwX** privileges. For example you can install in a subdirectory of your home directory. This installation will be available to you rather than all users.

3.1.1 Method 1 – Using the graphical front-end to RPM

In Red Hat Linux, the graphical front-end is called Gnome-RPM. (It is called other names on other Linux systems.)

Copy the rpm files **gempackei-1.0.1-8.i386.rpm**, **gemview-1.0.1-1.i386.rpm** to the RPMS directory. For example, the RPMS directory is called `/usr/src/redhat/RPMS` in Red Hat Linux, and `/usr/src/RPM/RPMS` in Mandrake.⁴

Start the rpm graphical front-end. For example, for Red hat Linux, type **gnorpm**

Installing the GEMPACK Executable-Image

Select the package **gempackei-1.0.1-8.i386.rpm** and install.

- (i) The GEMPACK program files will be installed in the directory **/usr/local/gp/gempack/gp80**
- (ii) The GEMPACK examples files will be installed in **/usr/local/gp/gempack/gp80/examples**
- (iii) The GEMPACK directory used when setting the environment variable 'gpdirc' is **/usr/local/gp/gempack**

The path and the environment variable `gpdirc` are set to the values described in section 3.5 below. The permissions are set to those described in section 3.4 below (where all users (**go**) have access to the GEMPACK files)

Installing GEMView

Then select the package **gemview-1.0.1-1.i386.rpm** and install.

The program GEMView and supporting files will be installed in the directory **/usr/local/gp/gemview**

Now go to section 3.3 to copy the GEMPACK licence file to the GEMPACK directory `/usr/local/gp/gempack`

⁴ To find your RPMS directory, type

```
rpm --showrc
```

The `topdir` entry is used to define the path to the top-level directory in RPM's build directory tree. The RPMS directory is a subdirectory of `topdir`.

3.1.2 Method 2 – Using the shell command rpm

Decide which directory you wish to install GEMPACK into.

The default installation directory is the directory **/usr/local/gp/gempack**

We suggest that you install in this default directory. However you can choose any directory you please. However do **not** choose "/" as your installation directory.

The GEMPACK .rpm file is called **gempackei-1.0.1-8.i386.rpm** Download it or copy it to a directory on your computer.

Installing in the default directory (/usr/local/gp/gempack)

As an example suppose the file gempackei-1.0.1-8.i386.rpm is in the directory /usr/keep

Run the rpm shell command to install the GEMPACK Executable-Image files:

```
rpm -Uvh /usr/keep/gempackei-1.0.1-8.i386.rpm
```

This rpm command installs the files from /usr/keep/gempackei-1.0.1-8.rpm into the default directories:

- (i) The GEMPACK program files will be installed in the directory **/usr/local/gp/gempack/gp80**
- (ii) The GEMPACK examples files will be installed in **/usr/local/gp/gempack/gp80/examples**
- (iii) The GEMPACK directory used when setting the environment variable 'gmdir' is **/usr/local/gp/gempack**

Run the rpm shell command again to install GEMView

```
rpm -Uvh /usr/keep/gemview-1.0.1-1.i386.rpm
```

The GEMView files will be installed in the directory **/usr/local/gp/gemview**

Now go to section 3.3 to copy the GEMPACK licence file to the GEMPACK directory **/usr/local/gp/gempack**.

Installing in a different directory

If you wish to install in a different directory, you need to add the option **--prefix <installation-directory>** to your rpm command.

As before, suppose the file gempackei-1.0.1-8.rpm is in the directory /usr/keep

For example, if you wish the installation directory to be /usr/local/gemodel

```
rpm -Uvh --prefix /usr/local/gemodel /usr/keep/gempackei-1.0.1-8.i386.rpm
```

- (i) The GEMPACK program files will be installed in the directory **/usr/local/gemodel/gp80**
- (ii) The GEMPACK examples files will be installed in **/usr/local/gemodel/gp80/examples**
- (iii) The GEMPACK directory used when setting the environment variable 'gmdir' is **/usr/local/gemodel**

Check that the GEMPACK program executables eg tablo, gemsim... are in the subdirectory gp80

```
ls -al /usr/local/gemodel/gp80
```

Run the rpm shell command again to install GEMView

```
rpm -Uvh --prefix /usr/local/gemodel /usr/keep/gemview-1.0.1-1.i386.rpm
```

The GEMView files will be installed in the directory **/usr/local/gemodel/gemview**

Now go to section 3.3 to copy the GEMPACK licence file to the GEMPACK directory **/usr/local/gemodel**.

Uninstalling the GEMPACK package

If you wish to uninstall the GEMPACK files the command is

```
rpm -e gempackei-1.0.1-8
```

3.1.3 Method 3 – Using a tar file and shell script

Installing the GEMPACK Executable-Image

You need to have the two files **gempackei-1.0.1-8.tar.gz** and the installation script **gempackei-1.0.1-8.install.sh** in the same directory either on your computer or on the installation CD.

Run the installation script at the command prompt to install the Executable-Image files. The script will ask you:

- (i) the directory where you want to install GEMPACK. This is referred to as the GEMPACK directory. The usual directory is `/usr/local/gp/gempack` but you can choose another directory. However do **not** choose `"/"` as your installation directory. In the examples below we assume that you are using `/usr/local/gp/gempack`
- (ii) whether you want to make changes to `/etc/bashrc` and `/etc/csh.cshrc` to set the environment variable 'gpdir' and add the GEMPACK directory to your path. The usual answer is yes. For details see section 3.5 below.
- (iii) whether you want the installation script to set the permissions for the GEMPACK directories for group and other users. The usual answer is to say yes. For details see section 3.4
- (iv) whether you want an uninstall script written.

After the installation completes, the GEMPACK executables: `tablo`, `gemsim`, `gempie`,.... as listed in section 1.2 should be in the `gp80` subdirectory of the chosen installation directory.

Installing GEMView

You need to have the two files **gemview-1.0.1-1.tar.gz** and the installation script **gemview-1.0.1-1.install.sh** in the same directory either on your computer or on the installation CD.

Run the installation script **gemview-1.0.1-1.install.sh** at the command prompt to install the GEMView files.

Uninstalling the GEMPACK or GEMView

If you wish to uninstall the GEMPACK files there is an uninstall script in the GEMPACK installation directory. For the Executable Image the name of the script is **gempackei-1.0.1-8.uninstall.sh** .

If you wish to uninstall the GEMView files there is an uninstall script in the GEMView installation directory. For GEMView the script is called **gemview-1.0.1-1.uninstall.sh**.

3.2 GEMPACK documents

The GEMPACK documents GPD-1, GPD-2, GPD-3, GPD-4, GPD-8 and this document GPD-10 are supplied as PDF files **gpd1.pdf**, **gpd2.pdf**, ..., **gpd10.pdf** which you can read or print using the Acrobat reader.

3.3 Copying the GEMPACK Licence File

Copy the GEMPACK licence file **licen.gem** from the floppy disk to the GEMPACK directory (where you installed GEMPACK).

For example, if you installed in the default directory, the directory will be `/usr/local/gp/gempack`

```
mcopy a:/licen.gem /usr/local/gp/gempack
```

We refer to this directory which contains the licence file `licen.gem` as the **GEMPACK directory** (in the first example above, it is `/usr/local/gp/gempack`. In the second example it is `/usr/local/gemodel`)

If you already have the licence on your computer in another directory, please copy the file **licen.gem** to this current GEMPACK directory. The environment variable `gpdir` should point to this directory.

Please see section 1.2 of GEMPACK document GPD-1 for details about GEMPACK licences for Release 8.0⁵. If you are installing the Demonstration version, you do not need a GEMPACK licence.

3.4 Setting Permissions for Group or Other Users

The following permissions should have been set up automatically as part of the installation above. If you wish to check the permissions, read the following section. If not, continue to the next section 3.5.

The permissions needed so that users (in your group or other users) can use the GEMPACK files are:

- (a) read and execute access for the directories so users can list the contents of these directories
- (b) read access to the licence file `licen.gem` in the GEMPACK directory
- (c) read and execute access to files in the `gp80` and `gemview` directories
- (d) read access to the example file in `gp80/examples`

Note that other users (in your group or other) should not usually be given write access to any of the files since they may inadvertently change or delete some of the files on which other users are depending.

3.4.1 Details of permissions

You can change the access to these files using the command **chmod**. How you do this depends on whether other users are all in the same group as yourself or not. For example, to give read permission to the files in `gp80/examples` to all users in your group, enter:

```
cd gp80/examples
chmod g=r *
```

If you want to give read access to all users on your machine (including those in your group) replace the last line above by

```
chmod go=r *
```

⁵ Release 8.0 licences are different from Release 7.0 licences but can be used with Release 7.0, 6.0 or 5.2 programs.

The following set of commands (in the order shown in each directory) will give the group adequate access and deny all access to persons not in the group. [To give this access to all persons, replace **g=** by **go=** in the commands below and omit the **chmod o= *** commands below.]

In the directory `/usr/local/gp` enter

```
chmod g=rx gempack gemview
```

In the directory `/usr/local/gp/gempack`

```
chmod g=r *  
chmod o= *  
chmod g=rx gp80
```

In the subdirectory `gp80`, enter:

```
chmod g=rx *  
chmod o= *  
chmod g=rx examples
```

In the directory `/usr/local/gp/gemview`, enter

```
chmod g=rx *  
chmod o= *
```

For more information, consult the manual entry for `chmod`.

3.5 After A Successful Install, Fix the PATH and gpdir

You must **start a new shell** so that the changes made to your shell configuration files come into operation.

The path and the environment variable **gpdir** are set up as part of the installations above. If you think this part of the installation hasn't worked or wish to check the setting, read the following section. Otherwise go to the next section.

For GEMPACK to run easily, you must make sure that the directory containing the GEMPACK program executables (usually `/usr/local/gp/gempack/gp80`) is on your path.

The Environment variable **gpdir** is set to the directory containing the GEMPACK licence (usually `/usr/local/gp/gempack`) so that the GEMPACK executables can find the GEMPACK licence file.

For the C shell

If for example the GEMPACK directory is `/usr/local/gp/gempack`, add the following commands to the file `/etc/csh.cshrc` to apply to all users, or to the `.cshrc` file in the user's home directory:

```
setenv gpdir /usr/local/gp/gempack  
set path=(/usr/local/gp/gempack/gp80 $path)
```

For the BASH shell

The corresponding commands to add to the file `/etc/bashrc` for all users, or to `.bashrc` in the user's home directory are

```
export gpdir=/usr/local/gp/gempack  
export PATH=/usr/local/gp/gempack/gp80:$PATH
```

You need to start a new shell for these changes to come into operation.

3.6 Text Editor

When installing and using GEMPACK, you will need to be able to edit text files. This is done using a text editor (that is, an editor designed for handling text files exclusively). There are many text editors available for Linux, for example gedit, pico, vi. Please use your usual text editor.

The Windows editors TABmate and GEMedit are not available under Linux.

3.7 Accessing the CoPS Web Pages from the CD

If you are installing from a GEMPACK CD, the CD also contains a snapshot, created in March 2001, of the Centre of Policy Studies (CoPS) Web site at Monash University. It is created as a convenience for those who do not have easy or rapid Internet access. Please be aware that the real Web site may well have been updated since this CD was created. The real web address is <http://www.monash.edu.au/policy/>

To access this snapshot of the web site, you do **not** have to be connected to the Internet. However, you do need a Web Browser, such as Netscape or Internet Explorer. Enter the location:

welcome.htm in your CDROM directory.

Links pointing to sites outside the Centre of Policy Studies, and *mailto* links have been preserved, but will only function if you are connected to the Internet.

Included in the CoPS Web pages are PDF versions of many of the CoPS/Impact Project Working papers which you can read or print out using the Acrobat reader.

CHAPTER 4

4. Testing the Installation

In this chapter we suggest that you test the main features of the installation by carrying out a simulation with the Stylized Johansen model.

If this simulation does not work, you will need to go back to some of the steps in sections 3 especially sections 3.3, 3.4 and 3.5 above.

You should carry out the tasks described in section 3.1.4 and in sections 3.1.6 to 3.1.11 of GPD-8 (making the few changes required for a Unix machine).

Rather than cluttering up gp80/examples, we suggest you work in a temporary directory (for example /usr/local/sj) and copy to it all files of the form **sj*.*** from subdirectory examples of directory gp80. That is, change directory to your chosen directory and then use a command like the following:

```
cd /usr/local/sj
```

```
cp /usr/local/gp/gempack/gp80/examples/sj* .
```

In particular, you will need the files sj.tab, sj.dat and sjlb.sti.

The other models provided (see section 1 of GPD-8) provide other tests. However, these models are provided to help modellers, rather than as test vehicles.

See also sections 3.2 and 3.3 of GPD-8 for suggestions for hands-on computing you may like to carry out to familiarise yourself with GEMPACK.

4.1 Checking the Path and Access to Your GEMPACK Licence

You must **start a new shell** so that the changes made to your shell configuration files come into operation. GEMPACK will not work until you have started a new shell.

Before carrying out the test simulations, we suggest that you check that your path has been set correctly and that GEMPACK programs are able to access your GEMPACK licence.

To do this, at the command prompt, type in the commands

```
cd /usr/local/sj
```

```
tablo
```

If your settings are set correctly, the GEMPACK program TABLO will start to run and it will find your GEMPACK licence. In this case you will be offered lots of options for the program TABLO.

Stop TABLO running by typing **Control-C** (that is, hold down the Control key, which is usually on the left of your keyboard and may be labelled "Ctrl", and, while holding it down, touch the C key). TABLO should stop running (though you may need to type Control-C twice).

- 1) If TABLO does not start running, your path is not as required. This may mean that you didn't change your initialisation file, or perhaps you haven't yet opened a new shell since you made these changes. See section 3.5
- 2) If TABLO started running but reported that it could not access your GEMPACK licence, the error message will tell you which licence file the program was trying to access. Please check that your licence file (it is called licen.gem) is in the directory in which you installed GEMPACK. If the program indicates it is trying to access licen.gem in a directory which is different from the one in

which you installed GEMPACK, check the parts of section 3.5 which relate to the environment variable `gmdir`.

- 3) Another reason that TABLO will not run is if you do not have execute permission for the executable program `tablo` in directory `gp80`. See section 3.4 for details. You also need to be able to read the licence file so must have read access permissions for the file `licen.gem` in the GEMPACK directory.

Check that the path and `gmdir` are correctly set. To do this, type

```
echo $PATH
```

```
echo $gmdir
```

Check that the path is as you expect, that is, that it includes the GEMPACK directory (usually `/usr/local/gp/gempack`). If you installed GEMPACK in a directory other than `/usr/local/gp/gempack`, also check that the variable `gmdir` has its expected value.

If any of these is not as required, read section 3.5 (and check that you started a new shell after the installation). Only proceed when everything is as required.

If any of these tests does not work, re-check the steps in the installation in section 3.5 above.

If you are unable to diagnose the problems here, please contact the Centre of Policy Studies. We will endeavour to assist. Details about how to contact the Centre of Policy Studies are in section 1.5.

4.2 Testing GEMVIEW

Work in the `sj` directory not the directory where `gemview` was installed. Open a new shell. Start the program `gemview` at the command prompt, by typing in the commands

```
cd /usr/local/sj
```

```
gemview
```

If the program does not start running, the symbolic link to `gemview` may not have been created.

The installation attempts to create a symbolic link to `gemview` in the directory `/usr/bin`. Look in this directory to see if there is a symbolic link called `/usr/bin/gemview`. If you are not installing as super user you may not have permission to write to the `/usr/bin` directory. In this case you need to create for yourself a symbolic link to `gemview` in some directory on your path. This symbolic link points to the startup shell script called **`gemview-1.0.1-1-startup.sh`** which is in the `gemview` installation directory.

For example, suppose you have installed `gemview` in your home directory in a directory called `/home/fred/gemview`. If your home directory `/home/fred` is on your path then you could create the following symbolic link

```
ln -s /home/fred/gemview/gemview-1.0.1-1-startup.sh /home/fred/gemview
```

This shell script `gemview-1.0.1-1-startup.sh` adds temporarily to the environment variable `LD_LIBRARY_PATH`, the directory in which `gemview` and some necessary library files are installed, and then calls the executable program `gemview`.

When you have `gemview` running you can look in its help file for further instructions about opening Header Array files and Solution files. Try opening the Header Array file called **`sj.dat`**.

There are also some test Header Array files (`.har`) and Solution files (`.sl4`) in the `gemview` installation directory.

4.3 *Checking Installation for other GEMPACK Users*

If you have run the checks in the preceding section as super user or root, and GEMPACK is to be used by ordinary users, you should repeat the checks as a group or other user. If the program table does not run, check the permissions are as described in section 3.4.

CHAPTER 5

5. Hands-On Computing on the PC

In this chapter we give suggestions for hands-on computing which will help you to become familiar with many important features of the use of GEMPACK on a PC. These are based on the models supplied with GEMPACK (see chapter 1 of GPD-8), especially the Stylized Johansen and Miniature ORANI models.

Note that the files corresponding to the example models sent with GEMPACK are all in the examples subdirectory of your GEMPACK directory (usually `/usr/local/gp/gempack/gp80/examples`).

Detailed suggestions for hands-on computing without using WinGEM can be found in chapter 3 “Unix/DOS Prompt: Hands-on Computing” of GPD-8. This begins with examples based on the Stylized Johansen and goes on to examples based on Miniature ORANI. You should ignore the examples there using TABLO-generated programs.

CHAPTER 6

6. Building Your Own Models

This chapter contains other information relevant to working with GEMPACK on your computer.

6.1 *New Model's Directory Location*

We suggest that each new model that you build is put in a separate directory on the hard disk, outside of /usr/local/gp/gempack. Note that your PATH command will ensure that the GEMPACK programs are found correctly when, for example, you issue the command

tablo

6.2 *If Your Model Becomes Too Large*

This may happen because you have exceeded the limits on your Executable-Image licence, or because you have run out of available memory on your computer.

6.2.1 Executable-Image Licence Limits

This subsection applies if you have a Limited Executable-Image GEMPACK licence. It does not apply if you have an Unlimited Executable-Image licence (see section 1.2 of GPD-1).

A limit is imposed on the size of the models you can carry out simulations with using this Executable-Image Version of GEMPACK. The only programs that may end with an error because your model has exceeded these limits are GEMSIM and SAGEM. The limits only apply to simulations. There are no limits imposed on the size of data-manipulation tasks you can carry out with the Executable-Image version of GEMSIM.

We expect that all simulations that could have been carried out with the Release 6.0 Executable-Image version of GEMPACK will also be allowed with the Release 8.0 Executable-Image version.

The limits on the size of simulations that this Executable-Image version of GEMSIM can solve are:

- Total number of (components of) endogenous variables, including any backsolved for, must be no more than 30,000.
- Total number of (components of) variables (exogenous and endogenous, including any backsolved for) must be no more than 35,000.
- Total number of (components of) endogenous variables in the condensed system must be no more than 10,000.
- Total number of (components of) variables (exogenous and endogenous) in the condensed system must be no more than 16,000.
- Number of nonzeros in the Left-Hand Side (LHS) matrix (for any step of the simulation) must be no more than 75,000.
- Total number of reals and integers used for coefficients (pre-simulation and updated), plus those used to store simulation results, must be no more than 250,000.

- Total number of components of variables (in the condensed system or backsolved of) with one argument⁶ and more than 40 components must not be more than 1000. [This condition should only affect single-country models with more than 40 sectors.]

The same limits apply for **SAGEM** simulations as for GEMSIM simulations, namely

- Total number of (components of) endogenous variables in the Equations matrix must be no more than 10,000.
- Total number of (components of) variables (exogenous and endogenous) in the Equations matrix must be no more than 16,000.
- Number of nonzeros in the Left-Hand Side (LHS) matrix (for any step of the simulation) must be no more than 75,000.

All the other programs supplied with this Executable-Image version should be able to handle arbitrarily large tasks, subject only to the amount of memory on your computer.

If a simulation you are carrying out exceeds the limits for the version of GEMSIM supplied with this Executable-Image version of GEMPACK, you will receive a message like the following one.

**%% This simulation has exceeded the dimensions allowed with GEMSIM
for your type of Executable-Image GEMPACK licence.**

To continue you would need a source-code version of GEMPACK

(or an "Unlimited Executable-Image" licence, if appropriate for you).

You can obtain these from the GEMPACK distributors.

This will be followed by details telling you by how much your simulation has exceeded the limits specified above.

With the Limited Executable-Image Version, your main alternative is to find another way of carrying out the same task. The only other alternative is to obtain a more powerful version of GEMPACK, either a Source-code version or an Unlimited Executable-Image version.

The limits shown above are also the limits for a Release 8.0 TABLO-generated program without any form of GEMPACK licence. If a simulation with a TABLO-generated program exceeds any of these limits, it will require at least an Introductory licence⁷ - see section 1.2 of GPD-1.

6.2.2 Not Enough Memory Available on Your Computer

If the task you are carrying out with any of the programs supplied with the Executable-Image version of GEMPACK requires more memory than is available on your computer, you will receive a message saying that the program is stopping because it is

unable to allocate sufficient memory.

⁶ Variables with two or more arguments, only one of which ranges over a set of size more than 1, are also included here.

⁷ Prior to Release 7.0, an Introductory licence was called a Large-Simulations licence.

If this happens, you may be able to free up more memory by closing down any other applications running (for example, word processors), in which case you can then try to rerun the task. Otherwise you need to find some other way of carrying out the task (or buy more memory).

6.3 Using Stored-input Files

You can use Stored-input files either via the GEMPACK **sti** option or using redirection of input as in, for example,

```
gemsim < sjlb.sti
```

or using the command line **-sti** feature (see section 4.5 of GPD-1), as in, for example,

```
gemsim -sti sjlb.sti
```

If you make your own Stored-input files to use via input redirection, it is a good idea to include the line

```
bat
```

at the start of these files. This means that, if the program encounters invalid input, it will stop. (See section 4.6 of GPD-1.)

6.4 Interrupting Programs

Sometimes you will start a program running and then realise that it is not doing what you intend. You can interrupt the program and return to the command prompt by typing Control-C (that is, hold down the Control key, which is usually on the left of your keyboard and may be labelled "Ctrl", and, while holding it down, type C). Sometimes you may have to type Control-C twice to achieve this.

6.5 Script Files

If you create a script files for carrying out tasks including running GEMPACK programs, you may like to take advantage of the fact that, if any GEMPACK program ends with a fatal error, it sets the value of the EXIT code to 1. If it has been successful, the EXIT code is set to 0. You can test for this in script files to stop the job early in such a case.

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