

Generating Reports With IPAT-S

by

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1 Starting Up...

1.1 Introduction

IPAT-S is a scripting language (a special-purpose computer programming language) for quantitative scenario analysis. A serious scenario exercise will generally result in one or more reports, as well as other outputs (web sites, tables, books, presentations, etc.). Managing these reports can take a great deal of time and energy. Especially time-consuming is the task of updating the numbers in the report – when the quantitative analysis is modified, finding and updating all of the values in the report can be an anxiety-producing task. The IPAT-S language has features that can make this process easier. This document explains how to do it.

To actually put these procedures in place, it is necessary to know something about the IPAT-S language. However, this document can also be read by someone unfamiliar with the language, but curious about the particular features that support report generation. All IPAT-S software and documentation is available for free from the IPAT-S web site, <http://ipat-s.kb-creative.net>.

1.2 The Essential Commands

There is a small set of essential IPAT-S commands and structures that are needed in order to dynamically generate a report. They are:

- The `print` block (for formatted output).
- The `clear`, `set output` and `reset output` commands (for sending output to a file).
- (Optional) The `start`, `run` and `wait` commands (for executing external programs).

A very simple example of applying these commands is given in the following script fragment.

```
# Erase the file output.txt if it exists
clear "output.txt"
# Set output.txt for all subsequent output
set output "output.txt"
print:
This is output going to output.txt.
:print
# Set output to go to the default
reset output
# View the output in Notepad
start "Notepad.exe" "output.txt"
```

In this example, output from the script is sent to a file `output.txt` that is then viewed in Notepad.

This simple example does not cover some of the most interesting possibilities for using IPAT-S to automatically generate reports. In more complex scripts, it is possible to:

- Generate reports in Rich Text Format (RTF), HTML or other text-based format.
- Embed calculations in the output.
- Change the output based on “if-then” conditions.

In this document, the procedure will focus on RTF formatted reports.

2 Creating an RTF Report Template

2.1 Introduction

The first step in producing a dynamic report from IPAT-S is to create a *report template*. This is a text-based report with embedded calculations. The easiest way to do this with a Rich Text Format (RTF) document is to use an editor that uses RTF as its native file format, or that can produce RTF output. These include:

- Windows WordPad
- OpenOffice.org Writer (available from <http://www.openoffice.org/>)
- The KeyNote editor (available from http://www.tranglos.com/free/keynote_download.html)
- Microsoft Word

Note that Microsoft Word is listed last – this is not because it is unpopular, but because it is the only option in the list that has to be paid for. WordPad is included with Windows, while OpenOffice.org Writer and KeyNote are free.

A recommended combination is to use KeyNote to generate an RTF document that is eventually imported into OpenOffice.org Writer. KeyNote has many useful features, especially the ability to organize notes by user-labeled tabs and a hierarchical tree browser and an option to export all notes to a single RTF document.

However, for this document, Windows WordPad will be used in all examples. This is because the program is installed on all Windows systems and also because it uses RTF as a native file format.

2.2 Working in WordPad

WordPad is available on most Windows systems under the **Start** menu. Go to **Start | All Programs | Accessories**. WordPad should be available under that folder. When started, it presents an empty file as shown in Illustration 1.

Use WordPad as you would any editor. As shown in Illustration 2, text can be formatted with specific fonts, font weights (e.g., bold) and font sizes. RTF also supports lists (bulleted or numbered). The RTF specification supports tables, but WordPad does not offer tools for creating tables.

To make a template, simply create the report as you would any report. However, when a value needs to be entered, use the IPAT-S syntax for an embedded calculation. This turns the report from an ordinary RTF report to an IPAT-S report template.

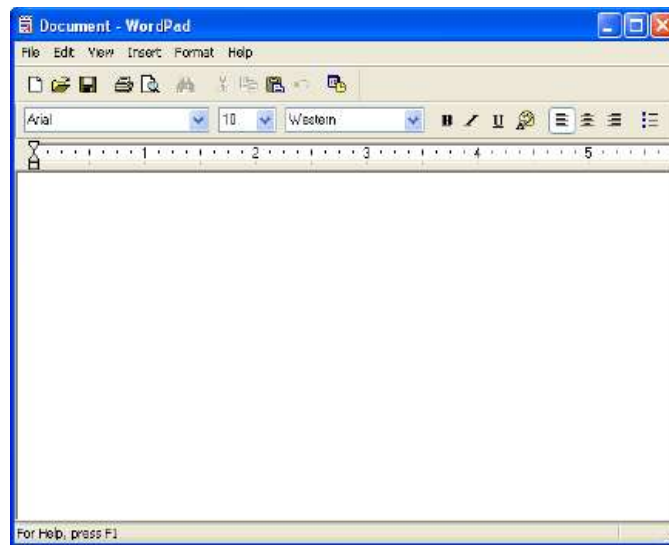


Illustration 1. WordPad when first opened



Illustration 2. WordPad with formatted text

2.3 Making a Report a Template

To make an RTF-formatted report into an IPAT-S template, whenever the text calls for a calculated value, enter an embedded calculation in square brackets, with an optional formatting statement. For example, use

Population in North Region grows from ["%.0f", Pop.0{region='North Region'}] thousand in the base year to ["%.0f", Pop.fin{region='North Region'}] thousand by the end of the scenario.

Note the use of “straight quotes” for the formatting statements. This is how they appear in WordPad, and how they must appear for IPAT-S to read the statement correctly. In more advanced

word processors, such as OpenOffice.org Writer or Microsoft Word, the straight quotes are turned automatically into proper quotation marks, like this: “ ”.

If the base year population in North Region were to be updated, or the population projections revised, then using a report template the values can be automatically updated. If the values are put in “by hand,” then any time they change they all have to be updated manually.

As can be seen from the example above, entering values using IPAT-S calculations requires more work up front than simply entering a number. However, it has several advantages:

- It is easy to update.
- It is possible to enter an IPAT-S expression even if the calculated value isn’t available.
- The definitions of the values being entered are explicit, which makes it easier to find errors.

It is well worth doing the work up front.

What to do if the report writers don’t know the IPAT-S syntax

In the likely event that the quantitative analysts are not writing the report text, the report writers may not know the IPAT-S syntax, so they cannot enter embedded expressions. In that case, the quantitative team can ask the report writers to put descriptions of what they want calculated in square brackets. For example,

Population in North Region grows from [base year pop in NR] in the base year to [final year pop in NR] by the end of the scenario.

The quantitative analysis team can then insert the appropriate expressions (with appropriate units following them).

If a square bracket is needed in the text, use double square brackets. For example, if the bibliographic citation style calls for references to be put in square brackets, like this [1], then in the report template they can be entered as “[[1]]”.

3 A Complete Example

3.1 Introduction

In this section, a simple, but complete, example of creating an RTF report template and executing it from within IPAT-S will be given.

3.2 The Procedure

1. Open IPAT Studio (the IDE distributed with IPAT-S) and start it with a blank script.



2. Enter the following script in IPAT Studio. This is a complete script, except that there is no output.

```
base year 2000
scenario years 2010 2020

summvar Pop GDP
ratio income

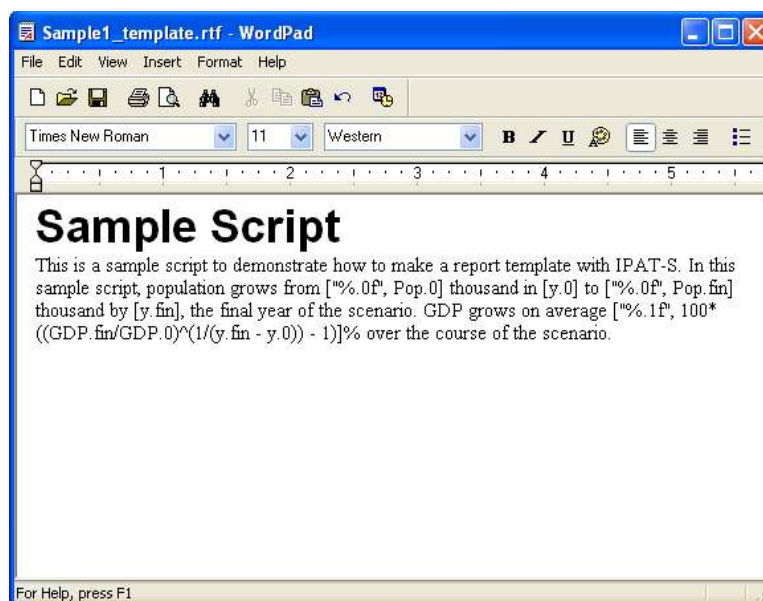
Pop = 350, 370, 380 # Population in thousands
GDP.0 = 500 # GDP in millions of $

# Set average annual GDP per capita growth
income = growth(2.0%, 1.5%)

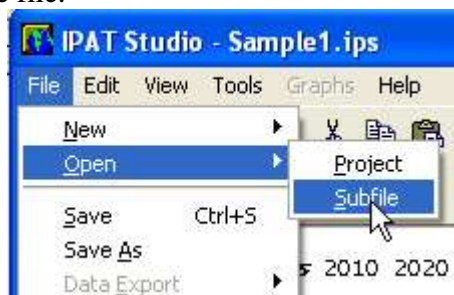
:: Pop >>income-> GDP
```

This script simply projects GDP based on growth in population and income (GDP/capita).

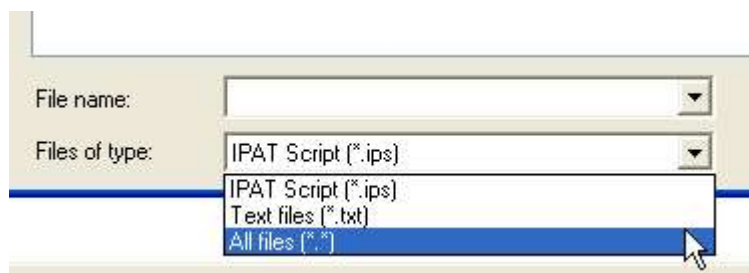
3. In WordPad, create a simple report like the following, with embedded calculations.



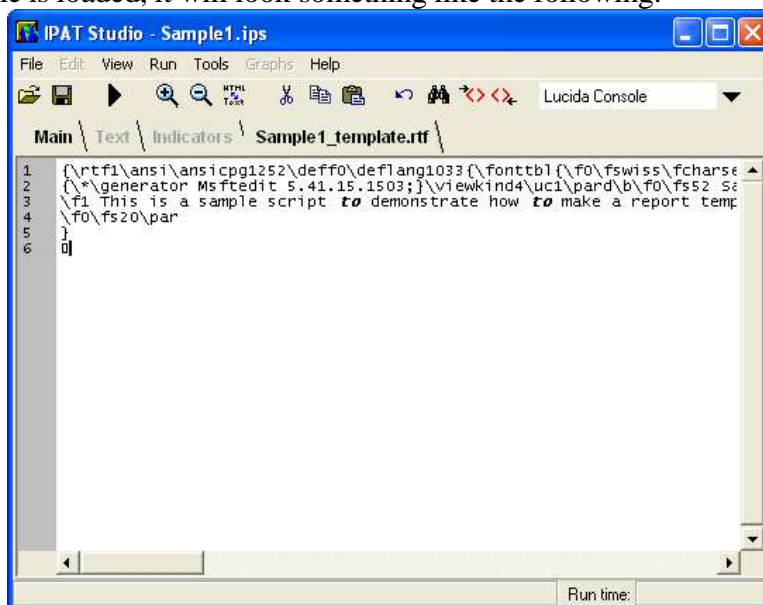
4. Save the RTF file with a name that flags it as a template. In the example above, the file was saved as “Sample1_template.rtf”.
5. When you have finished creating the report, close WordPad, and return to IPAT Studio.
6. In IPAT Studio, open the RTF report template as a **subfile**. Go to “File | Open | Subfile” in the menu, and search for the file.



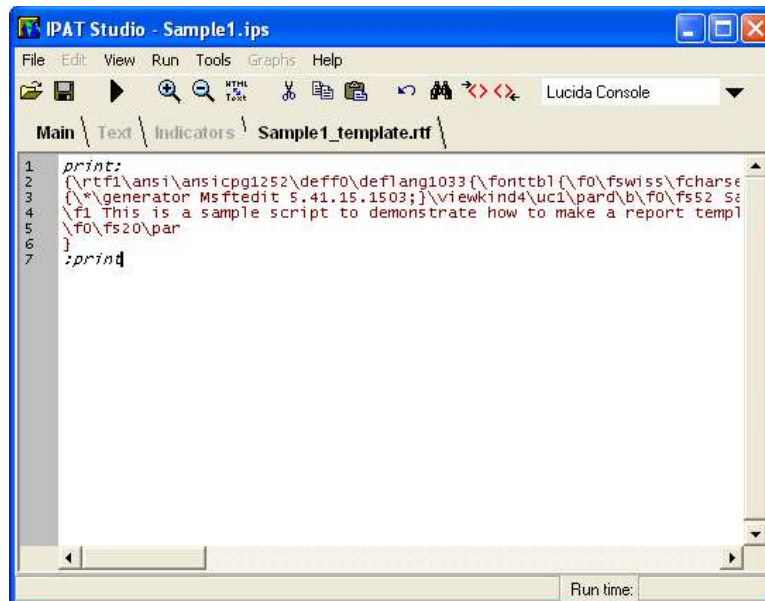
To open the RTF file, you will need to set the file type to “All files (*.*)” in the file open dialog.



Once the file is loaded, it will look something like the following.



7. Clean up the file by deleting the small box character at the end of the file. (It indicates an unprintable character that is not essential for the file.) Then put “print:” on the first line of the file, and “:print” at the end. The file should now look like the following.

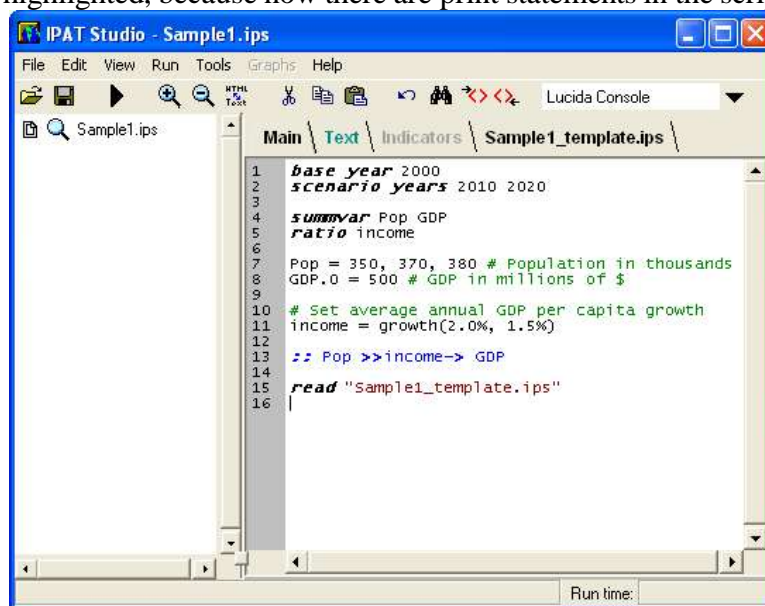


```

1  print:
2  (\rtf1\ansi\ansicpg1252\deff0\deflang1033{\fonttbl{\f0\fswiss\fcharse
3  (\*\generator Msftedit 5.41.15.1503;}\viewkind4\uc1\pard\b\f0\fs52 5:
4  \f1 This is a sample script to demonstrate how to make a report templ
5  \f0\fs20\par
6  }
7  :print

```

8. Save this file as an IPAT-S file, with an `.ips` extension. (In this example, the script is saved as “Sample1_template.ips”.
9. Return to the **Main** tab in IPAT Studio and change the script to read in the new template subfile. IPAT Studio will add a panel with a tree view showing included subfiles, and the **HTML** tab will be highlighted, because now there are print statements in the script.



```

1  base year 2000
2  scenario years 2010 2020
3
4  summary Pop GDP
5  ratio income
6
7  Pop = 350, 370, 380 # Population in thousands
8  GDP.0 = 500 # GDP in millions of $
9
10 # Set average annual GDP per capita growth
11 income = growth(2.0%, 1.5%)
12
13 :: Pop >> income -> GDP
14
15 read "Sample1_template.ips"
16

```

10. Add the script commands to send the output from the script to an RTF file. The modified script should look like the following.

```
base year 2000
scenario years 2010 2020

summvar Pop GDP
ratio income

Pop = 350, 370, 380 # Population in thousands
GDP.0 = 500 # GDP in millions of $

# Set average annual GDP per capita growth
income = growth(2.0%, 1.5%)

:: Pop >>income-> GDP

clear "Sample1.rtf"
set output "Sample1.rtf"

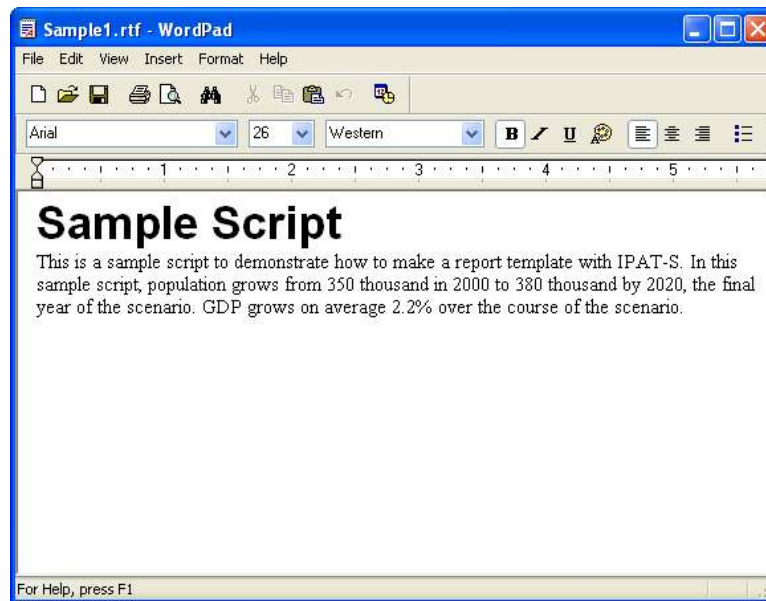
read "Sample1_template.ips"

reset output
```

11. Run the script by clicking the “Run Special” button on the toolbar:



12. Open the file “Sample1.rtf” in the standard way (e.g., by double-clicking on it in Windows Explorer). When the file opens, it should look similar to the template, but with the embedded calculations carried out and replaced by their values, as in this example.



3.3 Notes on the Procedure

There are some limitations to this procedure. One limitation is that in this approach no *styles* are defined in the report template. This means that if the report generated by IPAT-S is imported into OpenOffice.org Writer or Microsoft Word, it will be awkward to work with it. This is not a fundamental limitation – styles are supported by RTF, but are not generated with WordPad (or with KeyNote). Alternative ways of generating RTF files could produce styles: for example, creating a file in OpenOffice.org Writer and then saving it as an RTF file preserves the styles defined for the OpenOffice.org Writer file.

Another limitation is that it does not seem possible to launch WordPad from within the IPAT-S file directly using the `start` command. However, this should not be a severe limitation, since the file can be launched from Windows Explorer. It is also possible to launch WordPad indirectly by using a batch file. For example, on Windows XP, create a batch file (called, for example, “rtf.bat”) that includes the single line

```
start "C:\Program Files\Windows NT\Accessories\WORDPAD.EXE" %1
```

This batch file can then be used to launch WordPad from an IPAT-S script. In the example script given above, for example, put a command like

```
run "rtf.bat" "Sample1.rtf"
```

at the end of the script. Then, when the “Run Special” button is pressed, it will launch the file in WordPad.