Getting started with Napier

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Contents

1 Introduction

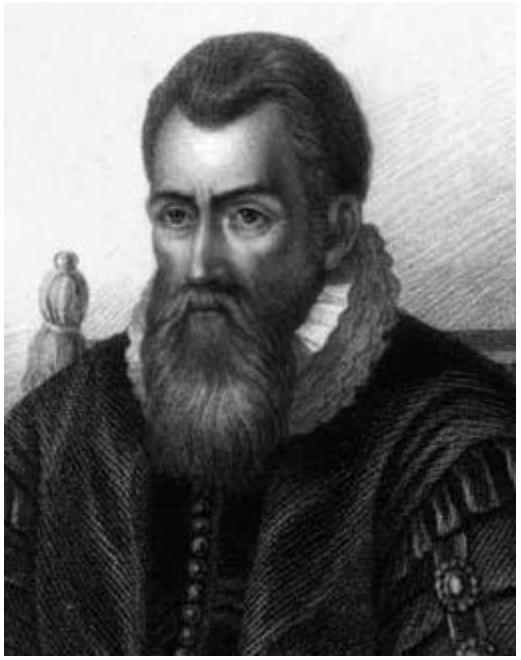
1.1 Are you in the right place!

Welcome! We've designed this book as a primer about getting to grips with our Napier calculations service. You won't find it a great deal of use in any other context, I'm afraid. But, if that's what you were expecting, then please read on and enjoy…

Before we dive into the details about how to create wonderful Napier calculations, it might be useful to give a general understanding of how the service works and, more particularly, the distinctive approach taken by Napier that makes it the best way to implement the calculations which power your business. Boring? Please feel free to skip this section – it won't do you too much harm.

1.2 About Napier

Napier [*named after John Napier (1550 - 1617) the Scottish mathematician who invented logarithms (pictured)*] is an advanced rules-based calculations engine service suitable for performing the kinds of calculations required in businesses – including quotations, illustrations, estimates, and valuations. The service has been developed primarily for the financial services industry, where there is an increasing need to process complex calculations very rapidly when providing online quotations; however, its applicability extends far wider. As well as numeric calculations based on algorithms or table look-ups, Napier can be used to make decisions or suggestions (such as, "what product best suits this customer?"), or evaluate assertions (e.g., "have all the mandatory fields been filled in on this form?"). Neither is Napier limited to returning a single result, it could instead provide a range of calculated options. The possibilities are truly endless.



1.3 What makes Napier special?

Napier has a number of distinctive features which make it stand out from the crowd.

1. **Napier operates online**
   Napier is provided as an internet based service, and so is not dependent upon users having the 'right' computing environment – there are no special hardware requirements, and no software to install. It also means that the service can be scaled to meet demand dynamically and with no 'down time'.

2. **Napier is fast**
   Napier has been designed to meet the most demanding needs within financial services, where price comparison websites like to receive calculated premiums from insurers within sub-second response times. This is particularly challenging, given that the pricing of most modern retail insurance products is based upon a very wide range of factors, and often involves look-ups in large tables as well as multi-stepped calculations.

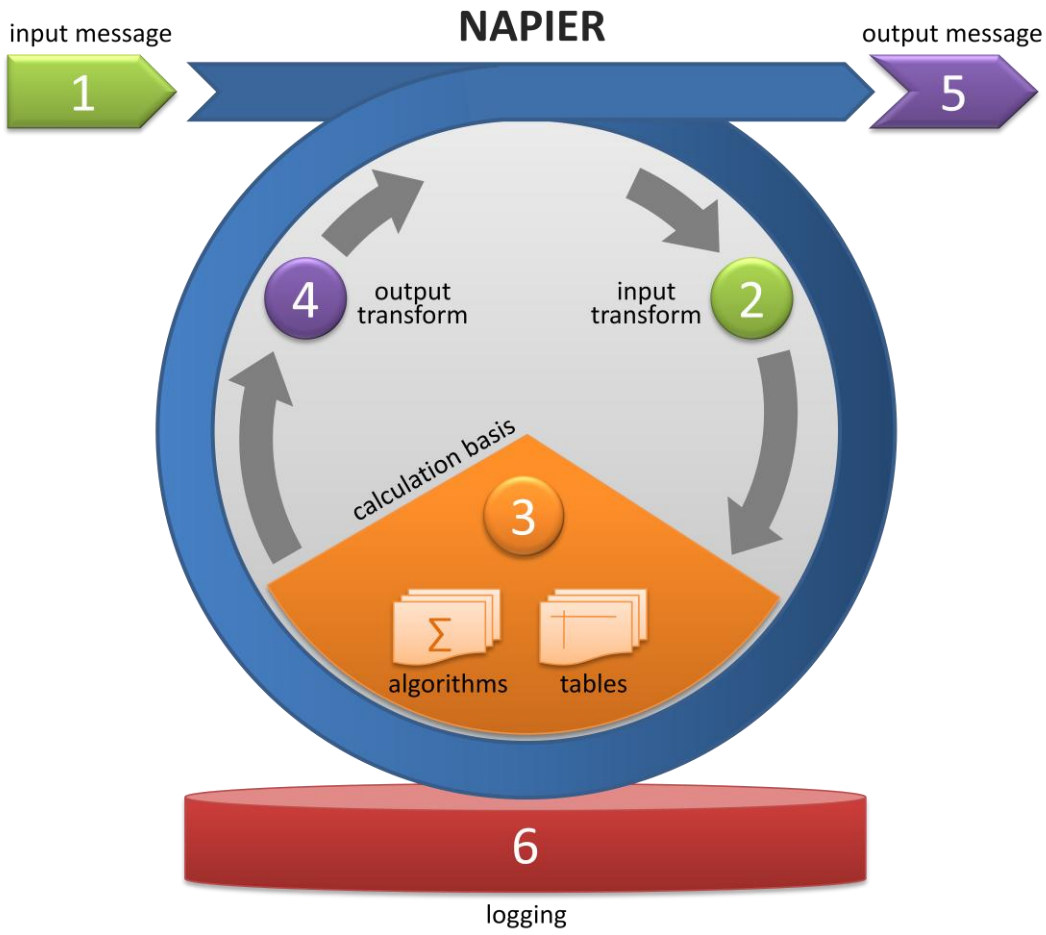
3. **Napier is comprehensive**
   Napier easily copes with the complexity of real-world business needs, supporting a wide range of calculation types, including: table-based, algorithmic, goal-seeking, etc…. These various types can be mixed together freely in as many steps of calculation as required. There is a full built-in calculations language allowing the realisation of the most complex calculations.

4. **Napier is model-driven**
   Like all Open Square products, Napier has been purposely designed to make it easy for non-IT people to setup and use. Calculation rules are specified through models drawn up (literally) by business analysts; algorithms and rates can be changed by the business; and everything is fully version controlled.

5. **Napier is easily integrated**
   Built using the latest modern open standards and technology, Napier is easily integrated with your web sites and main systems using XML messages over simple web service calls. And because Napier keeps a record of all requests and responses, your systems can retrieve and revisit calculations done in the past.

2 How Napier works

2.1 Performing a calculation



Napier accepts incoming calculation requests ❶ in a form you define (typically an xml message containing 'seed' data for a calculation).

This is unpacked by Napier ❷ which passes it to the calculation basis specified in the message.

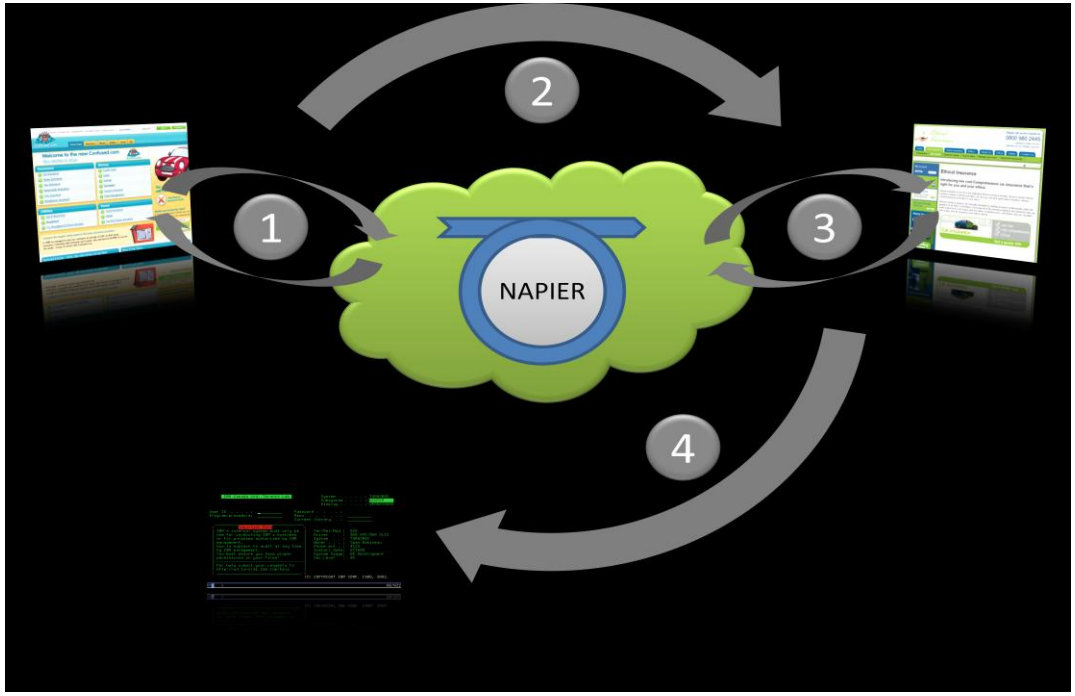
The calculation basis ❸ contains the rules to perform the calculations required (including all necessary algorithms and tables).

The results are processed by Napier ❹ into a format you define, and passed back to the calling application ❺.

Napier automatically keeps a record ❻ of the input and output messages it receives and creates, to allow for subsequent interrogation and reporting.

2.2 Putting it to work

Napier has been designed as a web service, and is most at home operating in a Cloud, such as Amazon's EC2 (see http://aws.amazon.com/ec2/). This approach means that the service is self-contained, behind a single clean machine interface, freeing clients from implementation concerns and facilitating simple integration.



A typical scenario might involve a company using Napier to provide an online quotations service. In this case, a price comparison website might interface with the service ❶ to obtain a rapid quote.

If this was the preferred option of the consumer, they would 'click through' to the company's own website ❷ to pursue the purchase.

Here there might be an opportunity to 'up sell' additional options, involving re-quoting ❸ via Napier.

Finally, with a sale concluded, the website would forward the details to the company's internal systems for recording and progression.

2.3 Managing the service

A web dashboard is provided giving users a means to monitor and manage the service. You can read more about it in Section 4. The Dashboard has a number of areas, as follows:

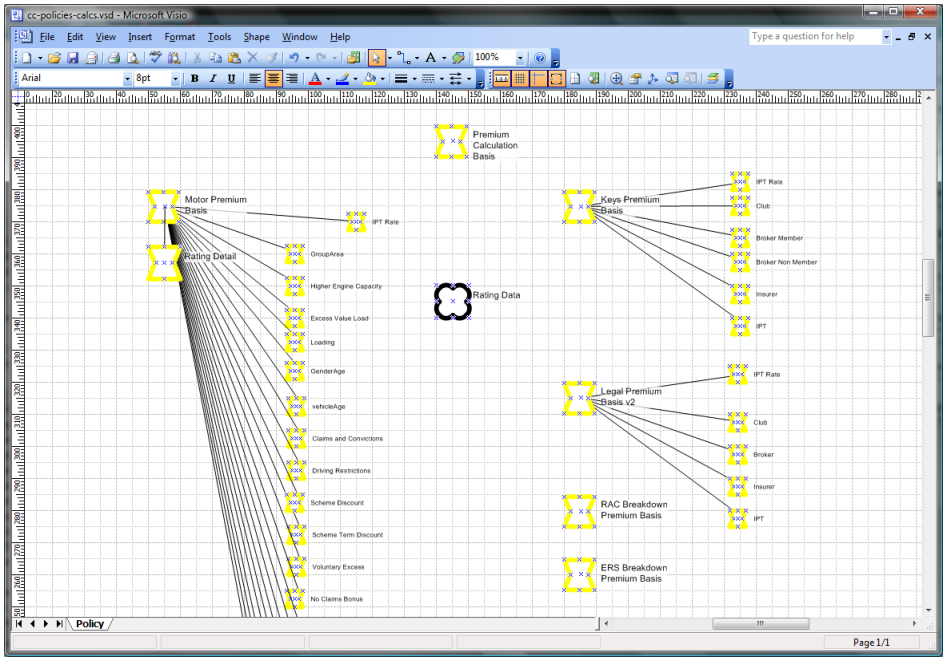
Stats	Showing the usage of the Napier service by your account. Statistics are gathered on volumes, errors and performance. It is possible to view these by hour, day and month.
Users	Lets you control who can access your Napier account.
Calculation Rules	Shows the calculation algorithms and tables loaded into your Napier account. From here you can manage existing files, and add new ones.
Instance Management	This area lets you track the servers powering your Napier service.

3 Creating a simple calculation

3.1 Getting started – some prerequisites

It is not difficult to dive in and get started creating your calculations and testing them out; but, before you begin you will need access to the following:

- a copy of Microsoft Visio with the Open Square Pact Add-In installed, and
- an account with a running Napier service,



Calculations are defined in Napier using an xml language. These files can be crafted by hand, but Visio provides an easy, more visual way, to proceed.

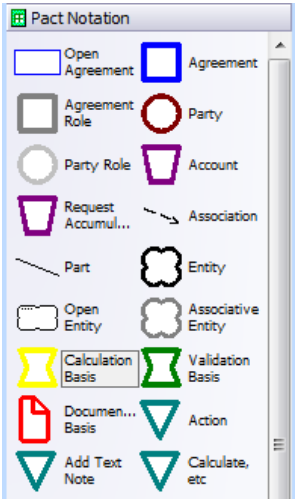
Using the Open Square Visio Add-In, the relevant symbols can be dragged into the model and configured. Right-clicking on a symbol then allows the requisite xml to be generated.

For the purposes of this document, a general working knowledge of Visio is assumed. (If you need help getting to grips with Visio, there are many resources around – try http://office.microsoft.com/en-gb/training/default.aspx , and search for "visio" to see Microsoft's own free videos.)

To operate your Napier account, you will also need the url of the **Napier Dashboard** (detailed below – see Chapter ???). This will allow you to login and install your calculations.

3.2 My first calculation

Open Visio and begin a new drawing. Drag the **Calculation Basis** symbol on to the drawing page. A calculation basis contains the rules which allow Napier to process a calculation. At its simplest, and for this first example, your calculation might comprise of just one of these yellow double-sigma symbols. Later, as in the example on the previous page, you will want to progress to more complex calculations which are made up of cascades of calculation bases – each basis defining a step in a calculation.

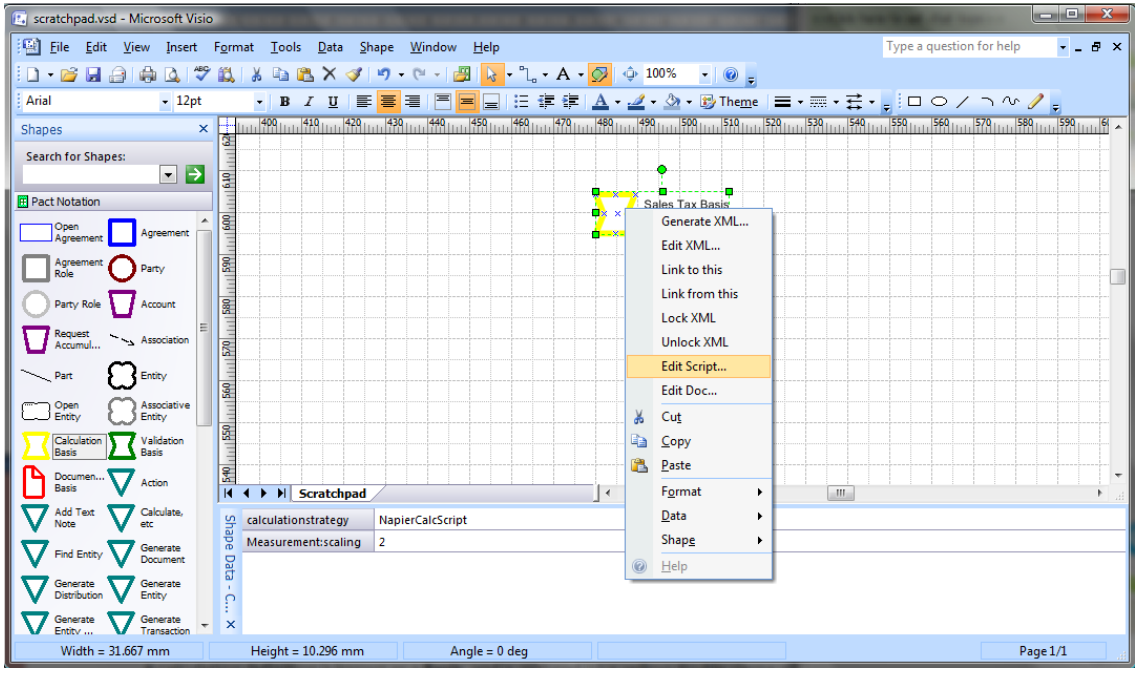


Each calculation basis has a **Calculation Strategy**. Think of the calculation strategy as being similar to a function in Excel (such as, SUM() or AVERAGE()). Napier has a number of built in strategies, and these can be easily extended with new ones.

The most basic strategy is called “NapierCalcScript”, it allows you to write out your calculation as a formula (a bit like typing “=A1+B2” into an Excel cell).

For this first example, we will produce a calculation which takes a supplied input value and multiplies this by a constant and returns the result. Sounds a bit simple? It is; but it’s just the sort of calculation done all the time to add sales tax to a price. So let’s give it a go…

Having dragged the yellow calculation basis into your drawing, simply type on the keyboard to replace the default name with something like “Sales Tax Basis”. Open up the Shape Data Window to see the properties of the symbol. You should see the calculation strategy set to NapierCalcScript.



To enter the formula for the calculation, right-click the basis symbol and select Edit Script… .

A simple text window opens into which we can type our formula.

If the sales tax is 15%, we could write something as simple as:

```
total = inputValue * 1.15
```

When run, this calculation would expect an input parameter named 'inputValue' and would return a result called 'total'. Incidentally, the result will be rounded to two decimal places courtesy of the 'scaling' property set on the symbol (see illustration above).

Of course, for maintenance purposes the formula we have entered isn't very clear. Instead we could write:

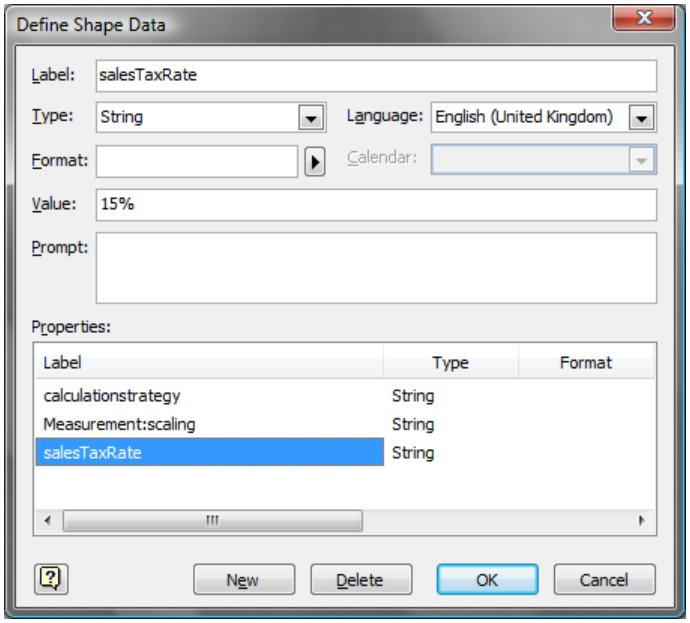
```
salesTaxRate = 1.15
total = inputValue * salesTaxRate
```

The first line defines a variable and its value, which is then used in the calculation proper. This may be more lines to write, but is far clearer to anyone else reading our work.

Better still might be to remove the 'salesTaxRate = 1.15' line from the script and define the variable as a property on the symbol. To do this, close the script editor, right click in the Shape Data Window (under 'Measurement:scaling 2' and select 'Define Shape Data…', then click 'New'. Add the SalesTaxRate property as follows shown here.

This approach has the advantage that others can see and amend the rate simply by inspecting the symbol, rather than opening up your script.

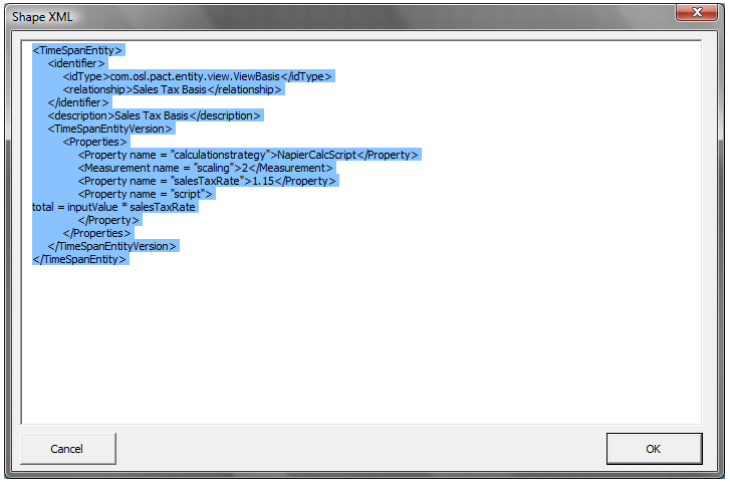
Ok, that's it, our first calculation written. Now, let's give it a go…



3.3 Loading our calculation

To use your newly created template, you need to upload it to Napier. Simply, follow these steps:

- Login to your Napier Dashboard with your username and password
- Go to the **Calculations Rules** tab of the Dashboard
- Go to the **Upload a resource** section of the page, with Type set as **Basis**, enter a Name and Effective period (be sure it covers the current day!)
- Switch to the Visio diagram and right click the yellow basis symbol to select 'Generate xml…' – you should get a window like that below. Copy all the text (Ctrl-A, Ctrl-C).



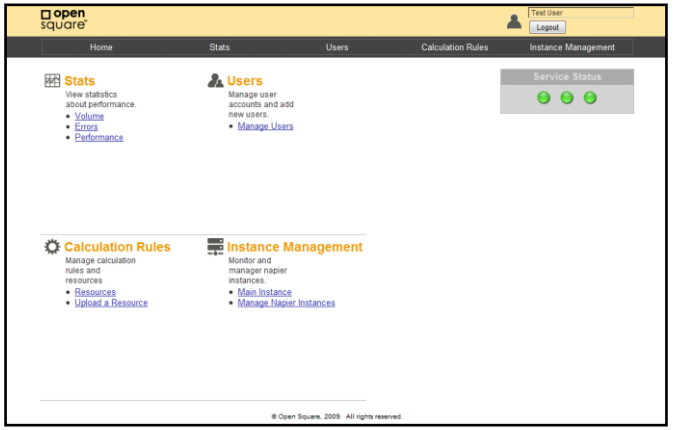
- Switch back to the Napier Dashboard, and paste the xml into the **XML** box (Ctrl-V).
- Finally, click the **Upload** button. Done!

Your calculation basis should now appear in the Resources view on that page.

4 Using the Napier dashboard

4.1 Accessing

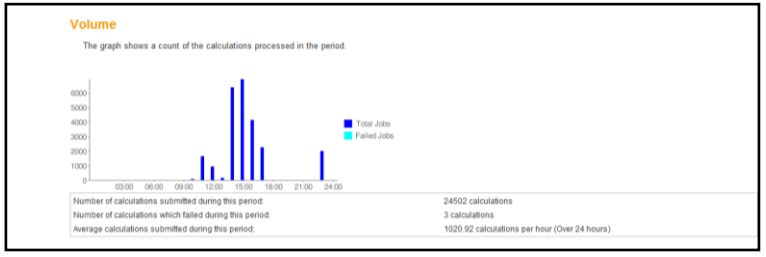
When subscribing to the service, an account on Napier will have been set up for you. Login at the supplied Napier Dashboard URL, with the username and password you have been given. You will see a page like this…



This is the Home page of the dashboard, and provides access for you to supervise and control the various aspects of the service.

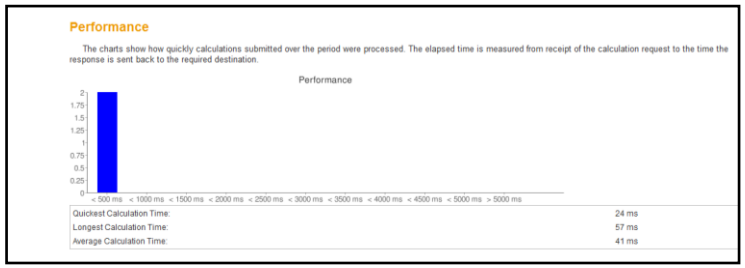
4.2 Statistics

Clicking on **Stats** takes you to a page providing details about your use of the service. A set of drop down boxes near the top of the page allow you to select the time period over which to view the statistics – this can be set to any specific hour, day, month or year. The page then falls into three main sections:-



Volume shows the throughput through your account for the time period specified.

Errors is a table of any calculations that did not complete.



Performance shows the time taken for your calculations to be carried out.

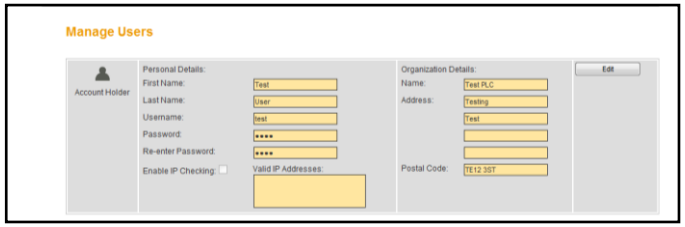
NOTE that performance is measured within Napier itself and excludes the time taken for messages to travel to and from Napier.

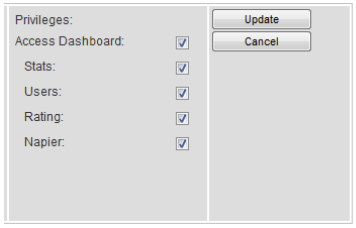
4.3 Users

The **Users** section of the dashboard allows you to manage access to the service. The page displays a list of known users. There is always at least one entry on this page (otherwise, how would you log in?!), representing the Account Holder. This is the top-most entry – it can be edited, but not removed.

The Account Holder always has full access. For this reason, it should be treated like a systems administrator account and not routinely used.

Any number of additional users, besides the Account Holder, can be added to the account – click the 'Add new user' button at the bottom of the list.



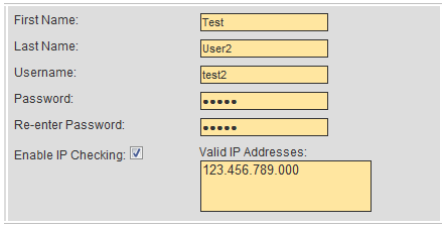


Access Rights

For 'normal' users it is possible to specify to which areas of the dashboard they are granted access. Check either the Access Dashboard box to allow access to all areas, or select the individual pages.

IP Checking

For all users it is possible to set up IP checking. This is a valuable security measure which, besides checking for a valid username and password at login, instructs Napier to also check that the user is coming from a known location.

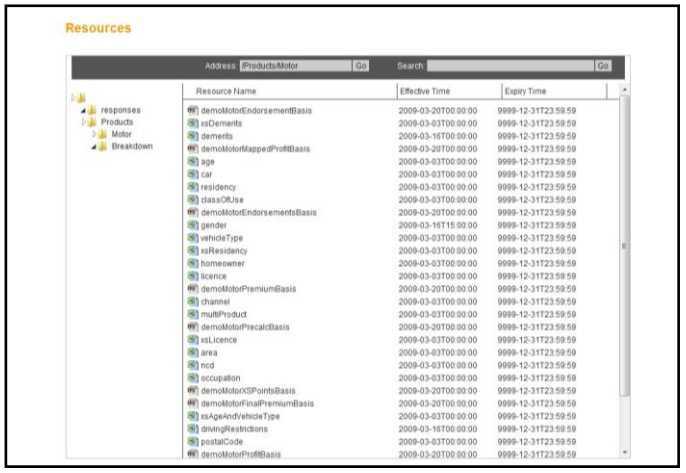


To obtain your IP address (which takes the form of 4 numbers, between 0 – 255, separated by dots) visit a site like www.whatismyip.com from the device you want to use to access Napier.

NOTE – that multiple IP addresses can be entered, one per line, if the user requires access from several devices.

NOTE – IP Checking is an additional level of security, but is no substitute for a strong password. Public IP addresses are not necessarily (or often) unique to individual devices and can be spoofed.

4.4 Calculation rules



The **Calculation Rules** area of the dashboard provides a window into the calculations lodged into Napier. It consists of a main area which acts as a file explorer, displaying folders in a tree structure on the right, and a list of documents in the selected folder in a panel on the left.

Napier uses a separate free-format storage area for each account. You are free to structure the space as you see fit. Right-click on a folder to bring up a menu allowing you to create new folders, and rename and remove existing ones.

Files are placed into a folder by using the Upload a Resource panel below the file explorer.

Right-clicking a file in the file explorer produces a menu allowing you to:-

i) **View** – displays the file in the browser or, if not of a recognised type, downloads it to your device

ii) **View History** – displays a popup window showing the version history of the file

iii) **Rename** – lets you change the name of the file

iv) **Delete** – removes the file

About Effective Times

All files have a start and end effective date/time. These are displayed in the document list and in the View History popup. These date/times controls are important and indicate to Napier which files are available for use at any given time. It allows you to create forward dated rates, for instance, and have them come into effect automatically at the time you preset.

When you upload a file with the same name as an existing one, the Dashboard will automatically end the effective period of the earlier version of the file at the effective start time of the new replacement file (minus 1 second!).

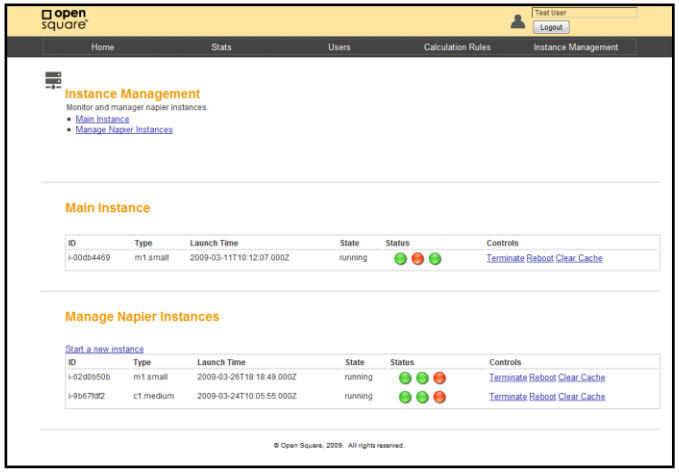
File Types

While you can upload files of any type to Napier storage, there a few file types which are particularly relevant. These include:-

XML – Napier calculation rules are stored as xml in files with an extension .xml

XLS – Excel files can be used natively within Napier to hold rate data in one or more worksheets

4.5 Instance management



The last page, **Instance Management**, shows the cloud servers deployed to support your Napier service. You should only make changes on this page if you know what you are doing!

Napier requires a single Main (master) server instance, and at least one Napier (slave) server instance. From this page it is possible to start new slave instances and to terminate or restart the other instances.

Why might you want to do this? The most common need is to match the number of slave instances to the expected load of calculation processing.

Slave instances of various sizes can be started depending upon processing requirements. A popup window appears when you click 'Start a new instance' allowing you to select the instance size.

Status Monitoring

Three status lights appear against each running instance. They give an immediate visual indication of the health of key software components - green = working, red = not working. In order, they indicate:-

i) **AppServer** – this is the foundation software needed to run our solutions, and is required on all instances. If it shows red, that instance should be terminated or restarted.

ii) **Napier** – this indicates the status of our calculations software engine. It must be green for all slave instances.

iii) **Database** – this shows the status of data storage. It must be green on at least one instance (usually the master) for logging of calculations to take place.

Clearing Caches

This action, available against slave instances, removes all calculation rules and rate tables from the memory of the associated instance. Clearing a cache forces that instance to reload information from the Napier file store thus absolutely ensuring that it is using the latest information.

NOTE – Ordinarily it should not be necessary to clear the cache of a running instance, the feature is included to aid support and debugging.

NOTE – After the clearing of a cache, that instance can take significantly longer to process the first calculation request received thereafter.

5 Next steps

5.1 Using your calculations

To use your calculations you will need to make a web services call to Napier, passing in the relevant data. There are various ways to accomplish this; one of our consultants will help you set up the test environment which works best for you.

5.2 My calculations aren't working right – help!

Don't panic. Authoring calculations is a skill which grows with experience. Remember to start simple – always get a straightforward approach working first; then add complexity bit by bit.

If you really cannot get your calculations working, feel free to involve our support team. We can't promise individual attention (unless you subscribe to a support package), but we might be able to point you in the right direction.