Load Sharing in SuperVal

January 2022

What is Load Sharing in SuperVal?

Load Sharing allows SuperVal valuation work to be "shared" across multiple sub-processes using the multiple cores generally available in today's computers. Those cores could be contained in the user's own computer, a colleague's computer or in a computer dedicated to performing valuation work.

This generally provides a significant improvement in valuation processing time as:

- Valuations for different Sex/Category groups can be processed in parallel; or
- Valuations for Sex/Category groups with a large number of members can be split into multiple valuations with smaller groups of members and processed in parallel; or
- Both.

The Load Sharing is enabled by establishing a "Valuation Broker" which is responsible for launching the Valuation Worker sub-processes and all communications with both SuperVal and the Valuation Worker sub-processes. The Valuation Broker can be monitored in your Browser showing the progress of any valuation work and the queue of pending valuation work.

Multiple Valuation Brokers (ideally each on a different computer to avoid having to share resources) can be established at the one time. For example, you may have a dedicated Valuation computer for each valuation team.

Description of Load Sharing Process in SuperVal

At this stage, we have implemented a single method of Load Sharing.

SuperVal sends valuation tasks to the Valuation Broker using configuration settings to decide whether Sex/Category groups need to be divided into a series of smaller valuation sub-groups.

The communication between Valuation Broker and SuperVal/Valuation Workers is via Sockets (a socket is a simple two-way communication channel through which two programs communicate over a network using well-established TCP/IP protocol) using each computer's IP address and a port number (specified in the configuration). Communications are encoded as simple text strings.

The Valuation Broker will launch Valuation Workers and then allocate these valuation tasks to the Valuation Workers and progress on the work is reported back to the Valuation Broker.

The inputs and outputs of a valuation process are transferred between SuperVal and Valuation Worker computers using the standard File system (using Universal Naming Convention (UNC) folder names) so it is necessary that the SuperVal installation, the computer running the SuperVal instance, the computer running the Valuation Broker and the computer running the Valuation Workers are on the same network.

The inputs consist of a compressed (and therefore effectively encrypted) package containing all valuation code, valuation variables (eg all valuation basis details) and the member data relevant to the valuation (sub-)group.

Other than the text valuation output (which is not available with Load Sharing) the outputs are those usually output by a SuperVal valuation run – native files containing database records to be uploaded to the Valuation Database and errors/warnings generated by the valuation run. These outputs are transferred

back to SuperVal, blended with other outputs if a Sex/Category valuation group was sub-divided into as number of smaller sub-groups, and treated by SuperVal in the same manner as any other valuation.

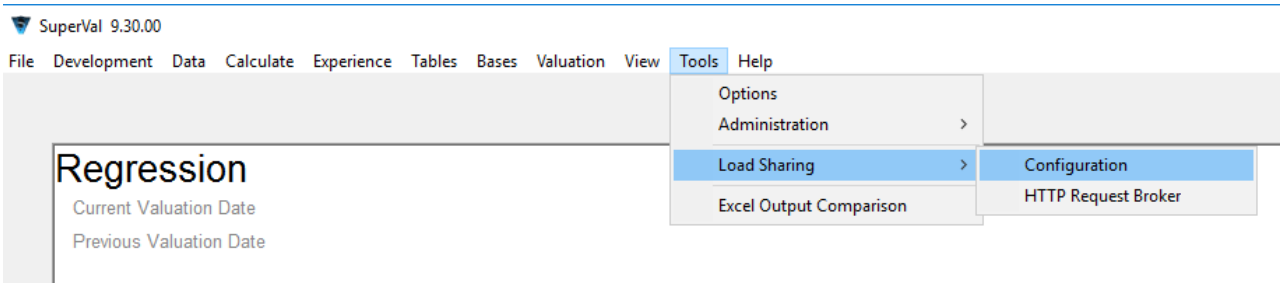
As the Load Sharing process involves many more file movements, it is recommended that the Valuation Workers computer has a high-performance disk drive.

Configuration of Load Sharing

The effectiveness (in terms of improving the speed of valuations) of the Load Sharing depends on a number of factors:

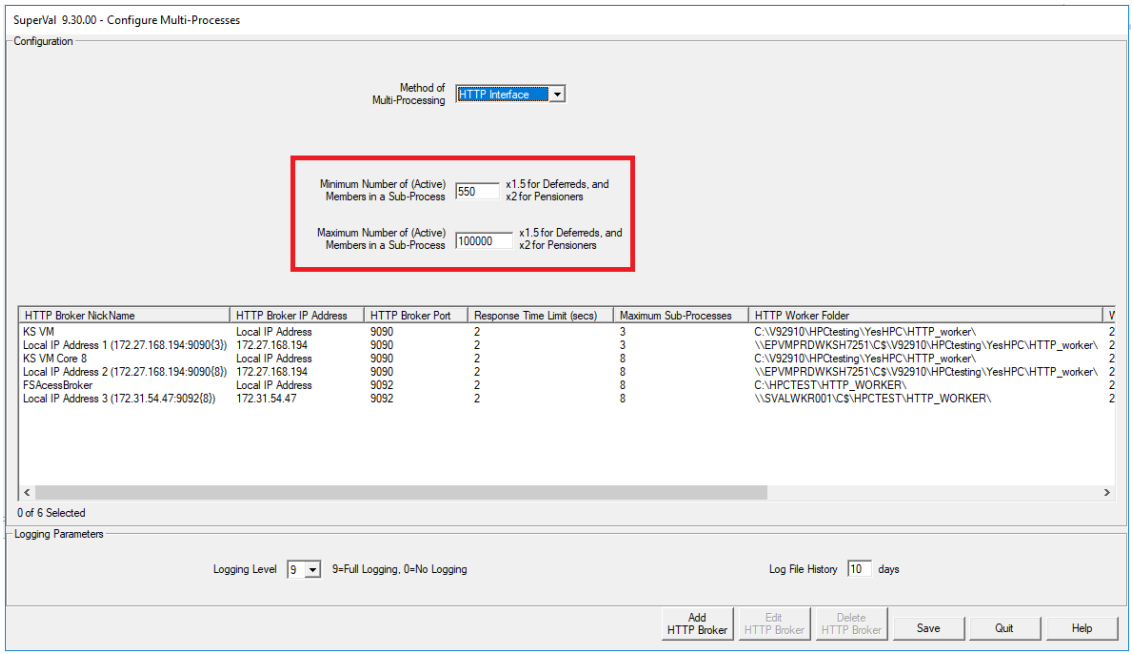
- The speed of the processor on the Valuation workers computer
- The number of cores available on the Valuation workers computer
- The amount of memory on the Valuation workers computer
- The speed of the disk drive on the Valuation workers computer
- The number of SuperVal users using any particular Valuation Broker

To help Users optimise the performance of Load Sharing in their particular circumstances, there are a number of configuration parameters used in the set-up of a Valuation Broker. These parameters can be input by an Administrator level user at ***Tools+Load Sharing+Configuration***



Configuring a Valuation Broker

The following Configuration screen will be presented:



The following parameters are common to all methods of Load Sharing.

Method of Load Sharing

At present, the only method of Load Sharing of valuation tasks is the Valuation Broker using a “HTTP Interface”. We hope to add others later.

Minimum Number of Members

The minimum number of Active members to create sub-divisions of a Sex/Category valuation run. Due to the quicker valuation timings, this number is multiplied by 1½ for Deferred members and 2 for Pensioner members.

Maximum Number of Members

The maximum number of members to be included in sub-divisions of a Sex/Category valuation run. As all membership data is loaded into the Valuation task, this parameter should be considered in conjunction with the Maximum Number of Sub-Processes and Valuation Worker Memory Allocation. Due to the quicker valuation timings, this number is multiplied by 1½ for Deferred members and 2 for Pensioner members.

Logging Level

To assist with the debugging of any issues with the Valuation Broker, the communications between the Valuation Broker and SuperVal/Valuation Workers can be logged into log files stored in the \log sub-folder of the \WLS sub-folder of the SuperVal install folder. It will be necessary to give all users write access to this folder.

The Level of logging can be varied from Full Logging (level 9) to No Logging (level 0).

Log File History

To enable quicker identification of issues, different logging files are created for:

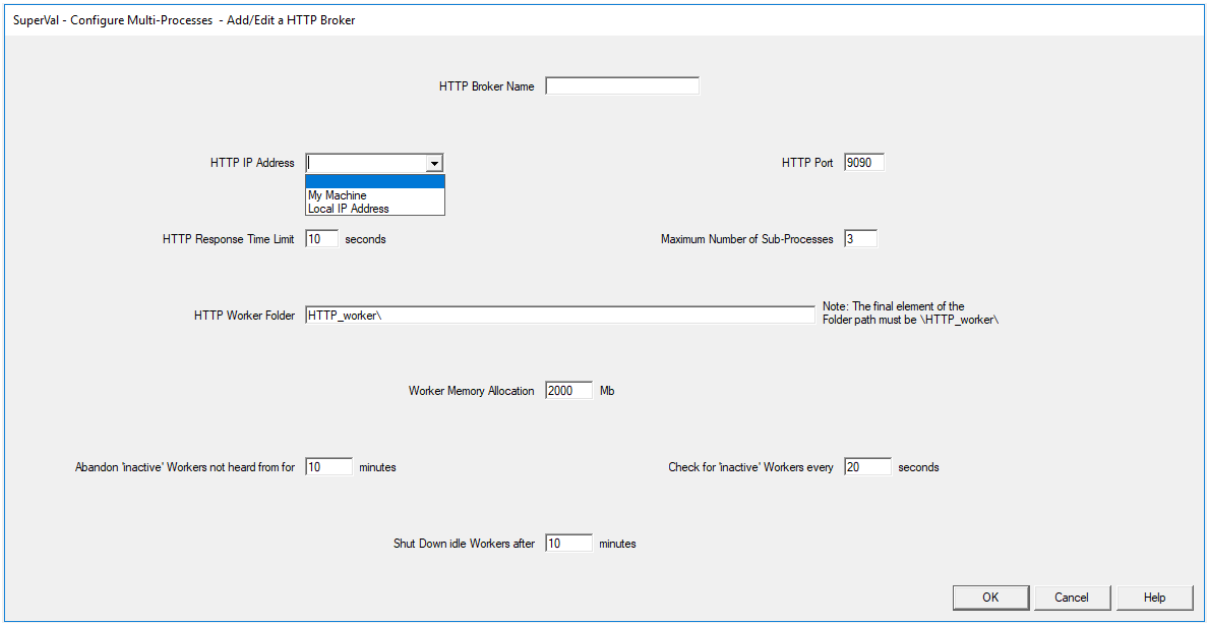
- Each SuperVal user
- Each Valuation Broker that is “active”

and these Logging files are “rolled over” daily which can result in a large number of files.

To avoid the proliferation of files, a limit can be placed on the time (in days) that these Logging files are retained.

Adding a new Valuation Broker

When adding a new Valuation Broker, you are presented with the following form:



Valuation Broker Name

A unique descriptive name which will be used by users when selecting the Valuation Broker they wish to use.

Valuation Broker IP Address

The IPv4 format of the IP Address of the computer where the Valuation Broker will be launched (IPv6 format IP Addresses are not supported). The IP Address can be either the local network IP Address (generally 192.x.x.x or 172.x.x.x) or the IP Address assigned by the ISP (although as files need to be copied between computers, all computers will need to be on the same network and will thus have local network IP Addresses).

There are two pre-coded options which can be selected here:

My Machine - This option uses the IP Address 127.0.0.1 which is an address referring to the computer launching the Valuation Broker. A Valuation Broker launched using this IP Address can only be accessed by the computer upon which it was launched. This can be useful in situations where the user has additional cores on their computer.

Local IP Address - For those who don't know their IP Address, this option will determine the user's local network IP address and launch a Valuation Broker with this IP Address. Note that when this Valuation Broker is activated, a new Valuation Broker definition will be added to the list of Valuation Brokers (if it does not already exist) – the name of which is displayed in a message.

Once established, the Valuation Broker is only used for communication between SuperVal instance and the Valuation Workers and the generation of Progress reports in the Browser so the Valuation Broker computer is not required to be particularly fast.

Valuation Broker Port

This is the Port through which communications are passed.

A port is a virtual point where network connections start and end and allow computers to easily differentiate between different kinds of traffic. Each port can be associated with a specific process or service and use of the commonly used Ports (eg 80 for Browser traffic) should be avoided.

Valuation Broker Response Time Limit (seconds)

The number of seconds allowed before a communication is assumed to have failed. As most communications (with the exception of establishing a new Valuation Worker) are dealt with by the Valuation Broker in milliseconds, this period should be kept quite short.

Maximum Number of Sub-Processes

The maximum number of Sub-Processes (or Valuation Workers) that can be established. This is generally the number of "spare" cores in the Valuation computer (although it should be decided in conjunction with the Maximum Number of Members and the Valuation Worker Memory Allocation). Obviously, the more Valuation Workers that can be launched the more valuation work can be done in parallel.

Valuation Worker Folder

A fully qualified path of the Folder which is to be used as the parent folder of the Valuation Worker folders. Each valuation task undertaken by a Valuation Worker will create a sub-folder of this folder which will contain all the inputs and outputs required for the valuation work.

The exception to this is the My Machine option for the IP Address, in which case the Valuation Worker Folder will be a sub-folder of the SuperVal Input Folder.

In all cases, the final element of the Valuation Worker Folder path must be \HTTP_worker\ which will be automatically added if not specified.

Valuation Worker Memory Allocation

The Memory Allocation to each of the Valuation Workers in Mb. This will most likely be the amount of "spare" memory divided by the Maximum Number of Valuation Workers. Another consideration when deciding this is also the Maximum Number of Members allocated to a valuation task as all the member data is read from file into the Valuation Workspace (compared to SuperVal which reads 200 records at a time).

Check for "inactive" Valuation Workers

The number of seconds between checks on "inactive" Valuation Workers (those that are not responding to the Valuation Broker).

Abandon "inactive" Valuation Workers not heard from

The number of minutes before a Valuation Worker that has not communicated to the Valuation Broker is shut down. Any work already allocated to an abandoned Valuation Worker will be allocated to another Valuation Worker.

Shut Down Idle Valuation Workers

The number of minutes before an idle Valuation Workers (one waiting for a valuation task) is shut down. Note that the Valuation Broker will always maintain one idle Valuation Broker at all times so it is ready to commence valuation work at any time.

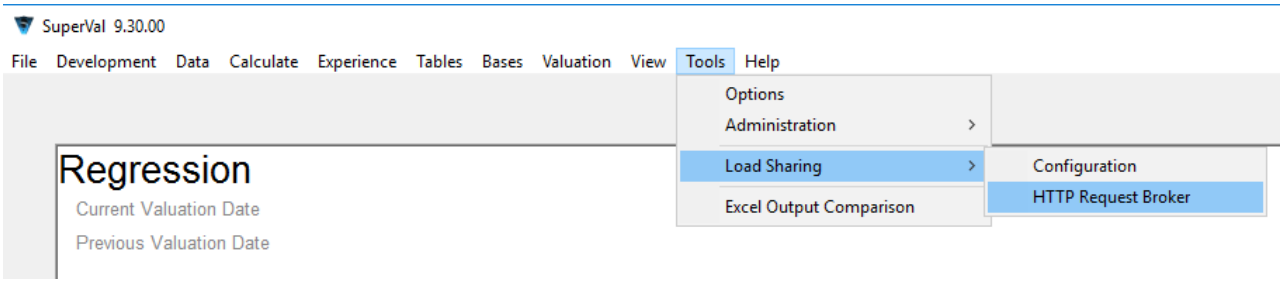
Editing or Deleting Valuation Brokers

Once a Valuation Broker definition has been configured, this definition can be edited at any time. Or Valuation Brokers definitions which have ceased to be relevant (eg if a Users local network address changes) can be deleted.

If a Valuation Broker is not shut down correctly (by pressing the Cancel button – see below) for any reason, it will continue to be regarded as "active". In this case, this Valuation Broker definition could be deleted to reset its "active" status to avoid it appearing in list of Valuation Brokers available for use.

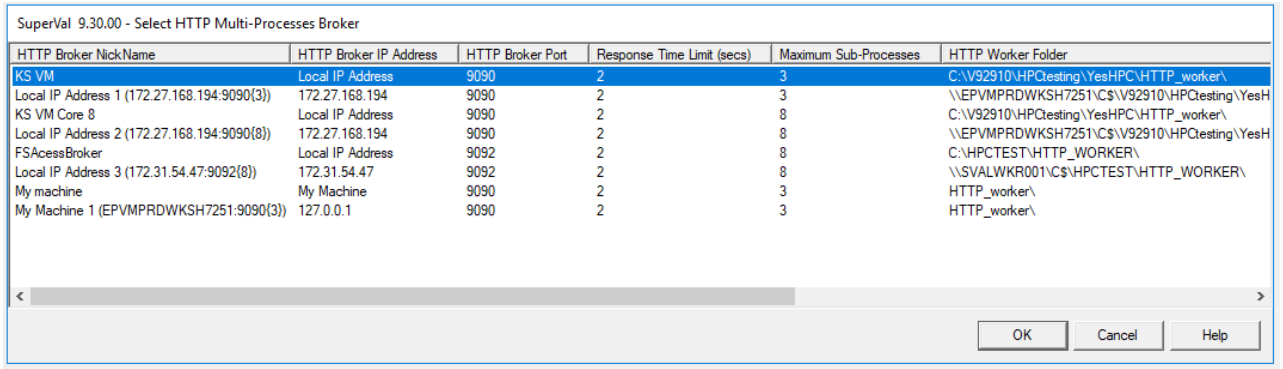
Launching a Valuation Broker

Once Valuation Broker have been defined, Users can launch a Valuation Broker at
Tools+Load Sharing+HTTP Request Broker



Users who do not have Administrator rights will only be able to launch a "My Machine" Valuation Broker (which is restricted to use on the computer upon which it was launched).

Users with Administrator rights will be presented with the following form:



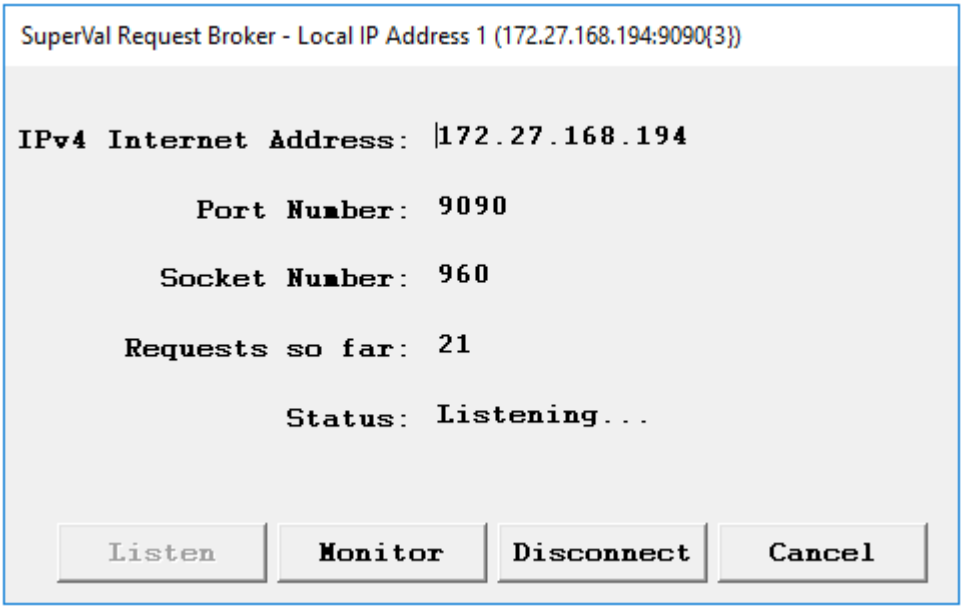
Select the Valuation Broker you wish to launch and it will be launched and tested to ensure it has been successfully activated.

Whenever the Valuation Brokers with an IP Address of “My Machine” or “Local IP Address” are selected, they will create a new Valuation Broker definition with the actual IP Address (unless that definition already exists). These new definitions are used in lists of available Valuation Brokers when preparing Valuation runs.

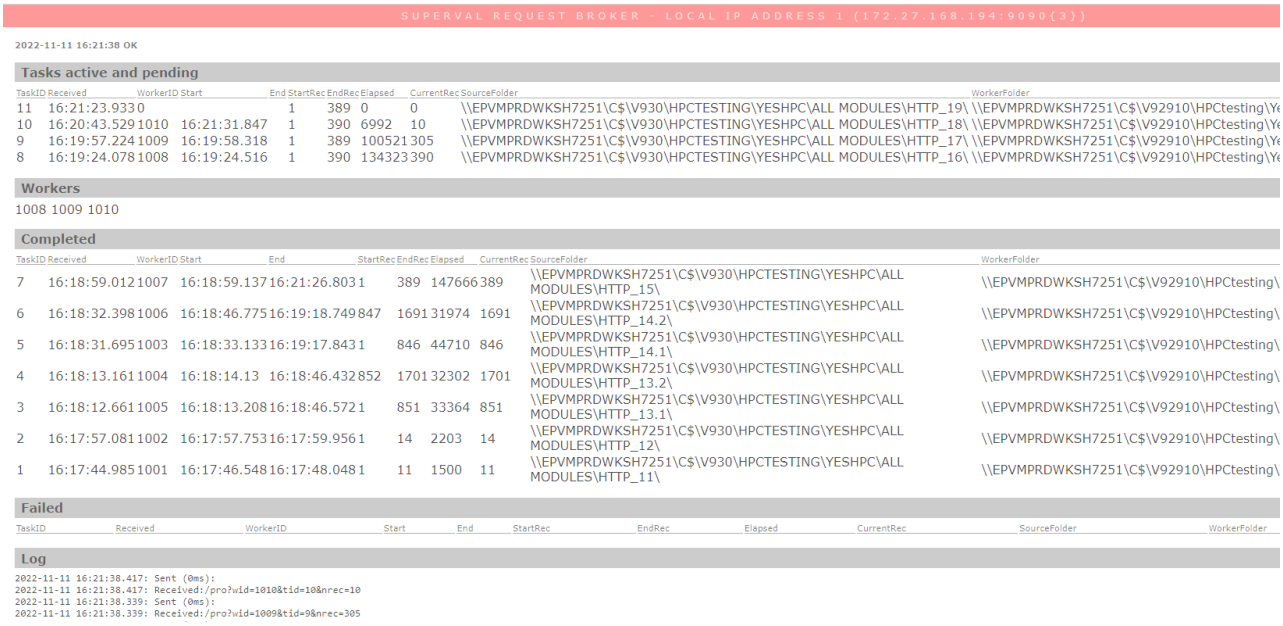
Obviously, this new Valuation Broker definition will be different on each computer (as “My Machine” is restricted to the local computer and IP Address will use the computer’s local network IP Address).

Selecting either the IP Address of “My Machine” or “Local IP Address” Valuation Brokers or the Valuation Broker definition they have launched will have the same effect.

Once a Valuation Broker is launched, SuperVal will show a pop-up box as below:



Users can monitor the progress of valuations in a Browser Dashboard by pressing the Monitor button.

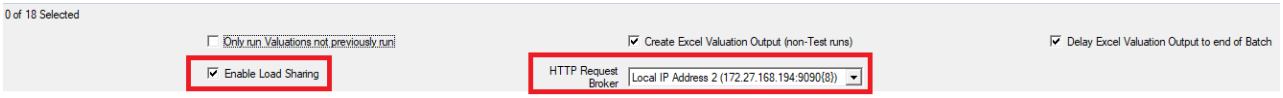


In theory, a Valuation Broker can be left running forever awaiting any valuation tasks communicated to it – it will even survive the computer being placed in hibernation. However, communications can be suspended temporarily while the Valuation Broker is not required by pressing the Disconnect button. The Valuation Broker can be reactivated by pressing the Listen button.

Pressing the Cancel button will close the Valuation Broker down entirely.

Using Load Sharing in a Valuation

There are two new fields on the Valuation Batch form as below:



To enable Load Sharing, tick the Enable Load Sharing box.

The preferred Valuation Broker can be selected from the list of HTTP Request Brokers. Note that only "active" Valuation Brokers will be shown in this list.