

Kestrel Fact Sheet 5

Technical Summary

1. Purpose of this Fact Sheet

The purpose of this Fact Sheet is to provide technical information regarding the implementation and operation of Kestrel. It contains information for IT people so they can determine how best to prepare for installation and ensure that all hardware, software and interfaces are appropriately specified and configured to give end-users of the system an acceptable level of service, and to ensure that the UIC is able to install and maintain the system.

This document provides high-level design and configuration details along with hardware and software requirements.

2. Design and development principles

2.1 System development methodology

Our aim is to deliver a working version of Kestrel in the fastest possible time that can be put to use immediately and progressively enhanced to provide a wider range of functionality.

Version 1 includes many standard features, in particular Dashboards, Reports, Enquiries and Analytical Tools (see Kestrel Fact Sheet 2). We also prioritise any critical functionality required by the client.

2.2 A look back over previous versions

The science of improving operational performance remains the same as it was when the UIC was established in 1992. Technology and the ability to gather and analyse data however has transformed.

The predecessors of today's Kestrel began in DOS. More recently we have used Oracle and then migrated to SQL. In-house hosting used to be the norm and it is now becoming the exception. Kestrel began life as a Winforms application and now, we have recently moved to an ASP.Net Core MVC web application.

Our policy is to adopt new technology, not as it becomes available, but as soon as it is proven to be reliable and we are certain that we are competent. We don't use our clients for experiments. Once we are sure new technology and software works we will migrate our existing clients on to it as part of our ongoing service to them.

2.3 Current system language

We have recently upgraded our platform to ASP.Net Core MVC using C#. We use Razor pages to display content.

To minimise the requirement for client software installation and maintenance, Kestrel uses ASP.Net and Internet Information Services (IIS) to deliver content to client browsers. Chrome and Internet Explorer/Edge are the recommended browsers, however Kestrel can be optimised to work on any browser. This method lends itself to frequent incremental version deployment.

A Kestrel Service will run continuously in the background which processes scheduled tasks such as importing files, sending out scheduled reports and other routine processes.



2.4 Access

Kestrel is optimised for accessibility, and is mobile ready so that users can access the product away from the office.

Kestrel can be modified to use a number of authentication processes, including Single Sign-on and Active Directory.

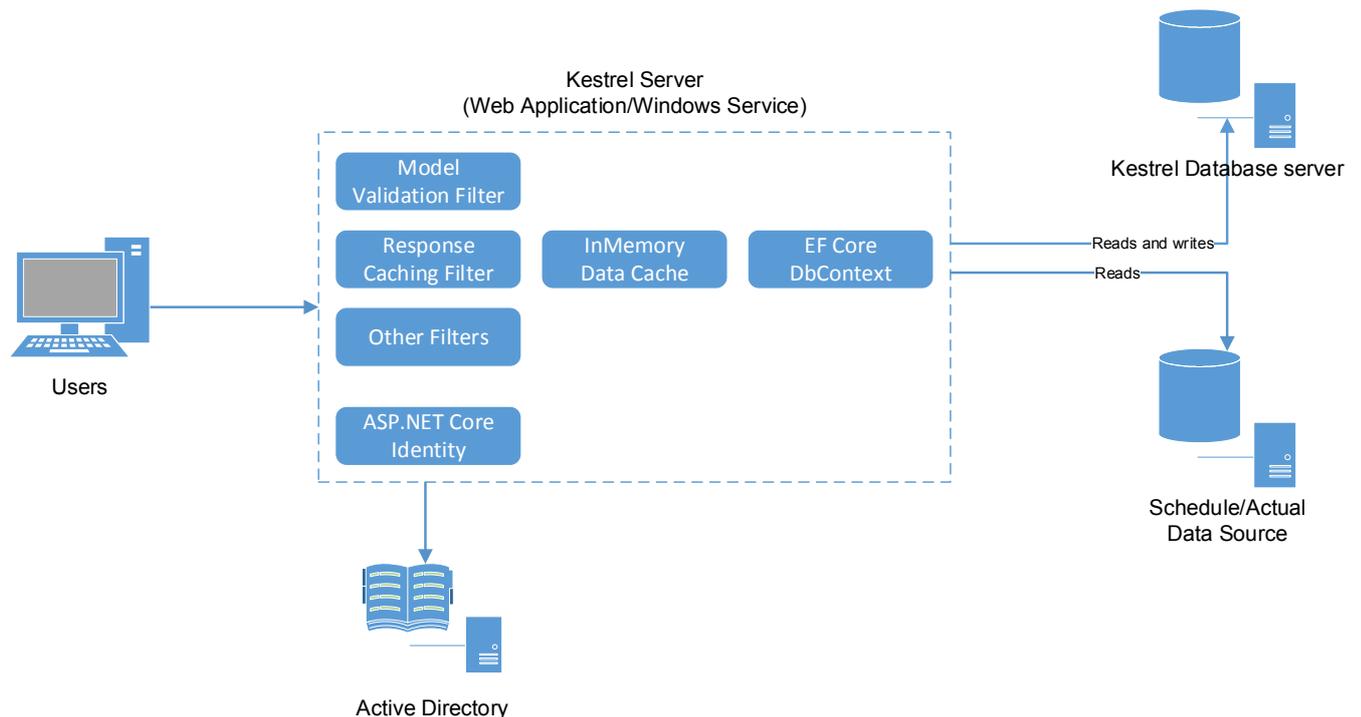
2.5 Modularisation and versioning

Kestrel comprises a number of modules that can be included, excluded or customised according to the client's requirements. The primary 'workhorse' modules are Dashboards, Reports, Enquiries, Analytical Tools and Attribution.

We implement new features incrementally rather than through a series of major releases. The advantage of this approach is that clients do not have to wait for the next major version to be completed before requested features are incorporated into Kestrel. This will be done, in liaison with the client to an agreed priority order. We have been working in this way for many years so have a robust testing and migration process that can be integrated into a client's Change Advisory Board (CAB) process (or similar).

These new features are delivered as an inclusion in the Monthly License Fee.

3. System architecture



4. Server configuration, hardware and software requirements

4.1 Option 1 - Software as a Service

Our recommendation is to take advantage of our ability to provide Kestrel as Software as a Service (SaaS). We can host the product and take care of maintenance and upgrades with minimal interruption to users. In Australia our software is hosted by Rackspace at their Sydney Data Centre. We chose Rackspace as a provider in 2016 following an extensive evaluation process and trials with a number of providers. In the UK our software is hosted by both UK Servers and Extraordinary Managed Services. This allows us an extra level of resilience should there be any serious failure. It is worth noting that we have had no outages in either Australia or the UK since introducing our hosted solution.

4.2 Option 2 - Client server

A number of our clients still prefer to host Kestrel on their own infrastructure and we have extensive experience in a wide variety of environments. Our recommendations are as follows:

- (1) 16-core processor, 2GHz or greater (more/faster is better)
- (2) 64GB RAM or above
- (3) 1TB SSD in an appropriate RAID configuration (e.g. 200GB for C:\ for OS and Kestrel application and service, and 800GB for database and file storage)

It is usual that the Kestrel Web Application and Windows Service sit on the same server with the database on a separate one, although this is not an absolute requirement.

We strongly recommend that Kestrel is not run on a virtual machine as this introduces the risk of performance degradation due to interference from other applications outside of our control. In particular Kestrel has peaks of processing workload, the most notable being imports following close of service and generation of daily reports which are often time sensitive.

Therefore we recommend a dedicated pair of servers as the solution.

We also recommend the use of at least three hard drives, one each for:

- (1) C drive (which may also contain the web application, or it may be on an additional drive)
- (2) SQL Data file (*.mdf)
- (3) SQL Log file (*.ldf)

4.3 Recommended software specification

- (1) Operating System: Microsoft Windows Server 2012 R2 or later
- (2) Microsoft IIS Version 7.5 or later
- (3) Microsoft .NET Core 2.1 or later
- (4) Microsoft SQL Server 2014 Enterprise or later
- (5) MS Office readers on the web server

4.4 Configuration settings

No customised configuration settings are necessary during the installation of the required software. Standard installations are sufficient.



4.5 Back-up and recovery

With SaaS, back-up and recovery is carried out by our hosting provider and we produce a Disaster Recovery Procedure, customised for each client.

For in-house hosting, responsibility for back-up and recovery of the server and database rests with the client (with our assistance as required).

5. Data storage

The primary data storage for Kestrel is a single database.

Kestrel can import data from a variety of sources. If data is placed in a file location to which Kestrel is granted access, Kestrel can consume it and then delete the files regularly. Kestrel can also connect directly to other databases to import data.

Temporary files are stored in a file location of the client's choosing and Kestrel is able to manage and delete these. Examples of temporary files produced by Kestrel include MS Word, MS Excel or Acrobat documents, typically reports, charts or data tables.

6. Number of users and peak load

There is no limit to the number of users and this is defined in the Licence Agreement.

The typical number of users logged-in at any one time is dependent on the size of the organisation and how embedded the use of Kestrel has become but is rarely above 40.

7. Interfaces with other systems

Kestrel will rely upon output from other systems within the client's network (or externally).

The web server and database server must be exclusively used by Kestrel to avoid interference by other users and programs.

Kestrel can not be used as a Data Warehouse, but we are able to export the data in Kestrel to the Data Warehouse of the client's choosing.

Here are some examples of existing interfaces:

- (1) Active Directory
- (2) AVM (Automatic Vehicle Monitoring)
- (3) Business Objects
- (4) Cubic (Go Card)
- (5) Flat file imports and exports (CSV, XLS)
- (6) Genius
- (7) HASTUS
- (8) Maximo
- (9) ODM (Operational Decision Making - IBM)
- (10) SAP
- (11) SQL Server databases
- (12) Tableau
- (13) TRUST
- (14) ViziRail
- (15) VoyagerPlan



8. Installation and updates

8.1 Client server - Installation and update process

We are able to remotely install and update Kestrel using the following steps:

- (1) Create Kestrel application directories
- (2) Copy compiled code and webpages into the directories
- (3) Modify web.config with correct SQL Server connection string and access methods
- (4) Create website in IIS for Kestrel application
- (5) Configure application pool identity and website
- (6) Test application is up-and-running and can connect to the database

The client will need to create service accounts for Kestrel to use prior to installation. These accounts will be used to access the database and Active Directory, and to run the IIS application pool and windows services.

The above arrangement is our preferred option by far as we have complete control and it minimises workload for the client. However as an alternative we can provide installation packages for your in-house people to install.

8.2 Client server - UIC access

We prefer remote administrative access to the Kestrel server in order to install new and updated modules and to perform routine maintenance. We will need to connect to the server's standard Windows GUI with sufficient privileges to carry out these tasks.

8.3 SaaS

If SaaS is a client's chosen solution, we will perform installations and updates at a time convenient for the client.

9. User access

9.1 List of users

The list of users able to access Kestrel is ideally controlled by the client via their Active Directory, to which Kestrel is integrated for authentication purposes.

At a minimum, there needs to be an ordinary user profile plus an Admin user profile set up for Kestrel to work.



9.2 User access

Client computers on the same network as the server will require Chrome, Internet Explorer version 9.0 or later or a compatible browser.

Computers that are not on the same network as the Kestrel server will need similar access via a browser or remote desktop connection. The client determines the appropriate method of access.

Older versions of Kestrel are progressively being optimised for mobile phone access. New versions will have this from the outset.

Provision may need to be made to allow access for external users (e.g. partner organisations). The client determines how best to accomplish this.

9.3 User operating environment requirements

- (1) Windows XP or later
- (2) Internet Explorer 9 or above, or Chrome 38 or above (or other compatible browsers)
- (3) Microsoft Office 2003 or later (to open Kestrel-generated documents in Word or Excel)
- (4) PDF reading software (to open Kestrel-generated documents in PDF format)
- (5) Access to the server via the internet/VPN

10. Security and reliability

10.1 Server/database security

Responsibility for security of the Kestrel server and database lies with the client, or with the UIC if SaaS is chosen.

The database is located within the client's network, and will only be accessed directly from the Kestrel application. Aside from Kestrel user names and passwords, which are encrypted, no sensitive data is held in the database. Encryption of other data may be introduced later if and when the need arises.

In order for an individual to access Kestrel, they must either have access to the server directly, or to the Kestrel application via a web browser. Access to Kestrel via a web browser requires either Active Directory authentication, or a Kestrel login account which can be created in the Admin Module of Kestrel. Kestrel login accounts must only be created for and given to individuals who should have access to Kestrel and only with the correct privileges. Access to the server itself must be restricted to authorised personnel, including the UIC, for maintenance and installation purposes.

The data and log files of the database should be placed in separate drives.

10.2 Regular monitoring

It is recommended that the Windows Service that Kestrel uses be continually monitored to ensure it is always running. The log-in page is suitable to use as a test page for monitoring.

This monitoring is the responsibility of client unless SaaS has been chosen.

10.3 Uptime

It is usual for Kestrel to achieve 100% uptime apart from the occasional planned outage for updates.



11. Support and maintenance

Our service to you includes:

- (1) Regular performance tuning to the Kestrel database, e.g. re-indexing
- (2) Creating database backups for escrow
- (3) Installing Kestrel web application and Kestrel Windows Service
- (4) Deploying updates to the Kestrel web application, Windows Service and database
- (5) Investigating bugs and providing fixes
- (6) Assisting with cleaning up the Kestrel server by deleting old files

For in-house servers, the client is responsible for monitoring server performance, repairing issues caused by other users on the server, software updates, Windows updates, creation and maintenance of database user accounts, creation and maintenance of Active Directory user accounts, virus and firewall protection, mail server troubleshooting, monitoring of disk space, or hardware maintenance.

Should a restart be required, we will work with the client to restart the Kestrel Windows Service and the SQL Server.

