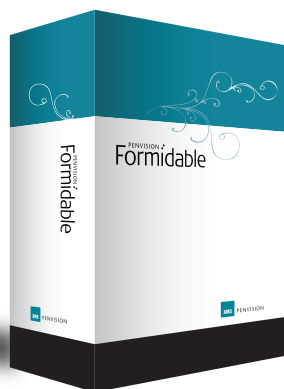


Formidable connectivity

White paper



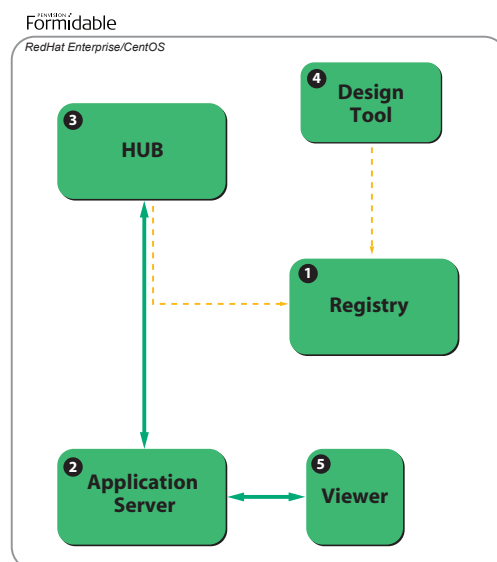
A complete Formidable system consists of a number of components, together creating a complete environment for rationalising forms processes with Digital Pen & Paper technology. This Whitepaper describes the different components and how they are connected to each other.

The numbers further down in this document are references to the illustrations on page 1 and 6.

THE FORMIDABLE SYSTEM

The Formidable System is installed centrally in a company network or can be hosted by a service provider, accessible via Internet. Formidable handles all the processor intensive tasks such as handwriting recognition, traffic between the Formidable Hub and the PenPusher clients, PrintProcessor coordination, license control and pattern & license purchase, creation and export of the final data to the backend system etc. The different modules in Formidable are connected via SSL to enable a secure environment.

Basic overview of the Formidable system



Overview of the components in Formidable

Registry (1)

The Registry is the part of Formidable that handles the licenses, users, pens, pattern and applications. It gives the administrator an overview of the current status and provides with a lot of options for tuning and controlling the forms applications.

Application Server (2)

The application server takes care of the application specific tasks such as handwriting recognition, imaging, export, custom development etc. It is possible to connect several application servers to one Registry.

Hub (3)

The hub coordinates the traffic between the PenPusher clients and the Formidable system. In addition to the basic strokes data the hub also handles two-way communication of different notifications as well as handles and exports GPS-positioning data via the Registry to the backend system. The hub requires open ports for the mobile clients to connect. Default port is 23 for ordinary mobile platforms and 8080 for Blackberry. It is possible to set the appropriate port in the PenPusher Portal.

DesignTool (4)

The DesignTool is a graphical application that is used to configure the functionality in the forms applications. Most of the functionality required can be created graphically in the DesignTool but it is also possible to customise the functionality via so called EventHandlers in the application server. EventHandlers requires PHP experience. The DesignTool work can be done separately from the Formidable system. The application is uploaded into Formidable's Registry.

Viewer (5)

Formidable Viewer is the validation interface where users can review and edit the final result from the digital pen application. The Viewer can be replaced by a client back-end system user interface if necessary.

THE PAPER (6)

The paper is both analogue and digital in the sense that it holds the pattern that enables the digital pen to capture the strokes while writing. When new clients gets acquainted with this technology a lot of questions are asked about system and software security while the nature of the paper is left with less attention. No matter what security level or method used, the physical paper is still there. A paper left in the fax, on a table or lost in public can be the single most critical security problem. It is therefore important to focus on all the aspects when analysing the requirements for a complete solution.

The content on the paper is also worth considering. As described further down in this document the form background is not transferred via PenPusher or even recorded by the pen. Only the handwritten strokes are transferred as mathematical data describing where the different strokes are located. If someone manages to get hold of a PGC-file, he/she can only unpack and read the strokes, not the whole form with the background. If the content on the paper does not identify a user, organisation or similar, the customer can lower the requirements for security in the transfer over the mobile network or local network.

Printing the paper (7)

Formidable PrintProcessor is used when printing on ordinary office printers or when creating print files for distribution via professional print shops.

The PrintProcessor is securely connected to a Formidable system over Internet/in-

tranet via https (SSL) and Basic Authentication. The users type in the login credentials when connecting the PrintProcessor to the Formidable system. Multiple PrintProcessors can be connected in parallel with the same Formidable system if necessary. From the PrintProcessor the documents are printed either from the graphical user interface or in the background via so called watched folders. The latter is for forms utilising backend system variable data for pre-population or when automating pre-printed documents including unique data such as a running number, date or similar.

THE DIGITAL PEN (8)

When the user writes on the paper the digital pen records the movements (strokes) in a vector based format. The digital pen stores the strokes in the internal memory with reference to pages on which the strokes were written by recognising the unique id on the paper. The digital pen can keep track of the different strokes and pages and add new strokes to the appropriate pages in the storage. The digital pen has also a unique id that is used in the Formidable system to tie the user account and pen together. The handwriting is sent from the pen in a so called PGC-file (Pen Generated Coordinates) which is transferred in different ways depending on choice of USB or Bluetooth transfer .

The PGC format

The PGC format is a binary format that is produced while writing with the digital pen. After transfer via PenPusher the PGC file is received and processed by the Formidable system. The main part of the PGC file is the strokes data (handwriting) which is specified in a x, y, force and time format. Also included in the binary part is the unique address for the paper (pattern) and the digital pen id. The binary format does not include the background as described earlier in this document. If someone unpacks the PGC-file it is possible to view the strokes information but the graphical fields and document branding is not visible.

The size of the PGC-file is primarily dependent on the volume of handwriting on the pages that are sent. The strokes are stored in a highly compressed vector based format which makes the PGC-files very small. This is particularly noticeable when sending data in the mobile network. Small quantities of data equals low cost for data traffic. The size of the PGC-files ranges from a few KB for some checkboxes on a simple page up to 30-40KB for a fully written A4 note page. In extreme cases when for example writing on many pages in a notebook without sending, the PGC file can add up to substantial amounts of data.

Transferring from the pen via Bluetooth to a mobile device (9)

The binary PGC-file is sent from the digital pen to the device via Bluetooth. The PGC-file is captured on-the-fly by PenPusher via the Serial Port Profile (RFCOMM) in Bluetooth. A transfer is initiated by a mark in a Send box. Even if the send boxes look the same they can instruct the pen to behave in different ways. It can instruct the pen to send the particular page where the user is marking the send box on, or all pages that were used in the application (for example multipage forms).

The pen operates using Bluetooth when using mobile devices. Bluetooth is secure in that it employs several layers of data encryption and user authentication measures. For more information about Bluetooth please refer to www.bluetooth.com

Transferring from the pen via USB to a Windows computer (9)

When the pen is docked in a USB-cradle the PGC-file is created on the PC and further processed in PenPusher. The PGC-files include all the strokes in the digital pen, not only the strokes written on the last paper. The Formidable system receives the information and processes the data accordingly. This differs from the mobile method of sending the data since the USB-version does not use a send box. A USB transfer can therefore result in several items in the PenPusher document list. It is possible to combine a document with both USB-docking and a send box for Bluetooth transfer.

PENPUSHER CLIENT SOFTWARE (A)

PenPusher is the client software that is used together with the digital pen. PenPusher clients serve the user by transferring the PGC file to the Formidable system but also to continuously notify the user about the progress. PenPusher is available on Windows XP/Vista/2000 and mobile operating systems such as J2ME, Symbian60, Windows Mobile and Blackberry. PenPusher works with a proprietary two-way protocol enabling data transfer back and forth between the Formidable system and the device.

When the PGC data has been received by the device PenPusher immediately tries to send the data over to the Formidable system. If the device is online the Formidable system will receive the PGC-file and process it according to the application configuration from the Formidable DesignTool. If the device is off-line the document will be queued up while waiting to get on-line.

Distribution via PenPusher Portal (B)

The PenPusher client software is distributed via the PenPusher Portal which enables administrators to push out dedicated download links to users via SMS or email. When the user receives the link it is possible to immediately download the PenPusher software. PenPusher versions can be customised with customer's own preferences and pre-filled with the user information from the PenPusher Portal. It is also possible to brand the client software in J2ME and Blackberry versions. The administrator must additionally define to which Formidable system the clients should be connected. When the user registers the first time PenPusher will connect to a centralised Penvision service that re-directs PenPusher to the appropriate Formidable system. The Penvision service will not be used after the first connection has been established.

The PenPusher Protocol (C)

The PenPusher protocol is a proprietary protocol developed by XMS Penvision. It is optimised and streamlined for rapid two-way communication between the Formidable system and PenPusher. PenPusher uses the proprietary protocol to exchange data with the Formidable system. In contrast to most routers on the market PenPusher can not only send PGC-files but also send and receive customised "PenPusher forms" that enables users to interact with the Formidable system. A PenPusher form can include fields where recognised handwriting is edited. A form can also notify the user that a certain field must be filled out for the form to be completed. An other option is that the user can attach photos or other media files and send them via such PenPusher

form. The exchange between the Formidable system and PenPusher happens immediately. The user often experience that the processing was done on the mobile device while it is actually done on the server.

It is technically possible to push out messages from the Formidable system to PenPusher clients.

The PenPusher protocol uses a basic scrambling algorithm. If the security level, for a mobile project, must be higher it is possible to assign a dedicated GPRS-network (VPN). This is offered by mobile operators for an additional cost. If the project is USB-based the pen is normally docked with a local Windows PC in a company network. The transfer is then done inside the firewalls not requiring additional security level.

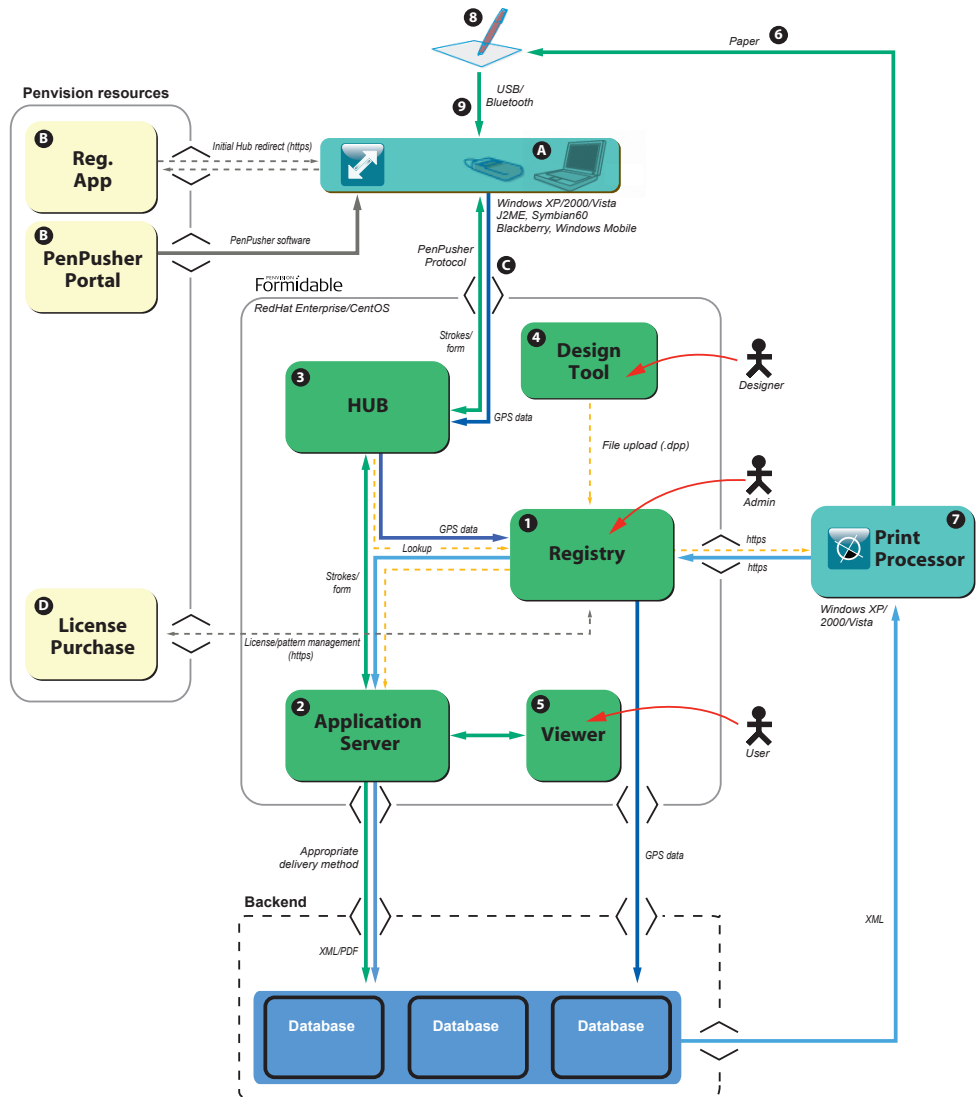
BACKEND SYSTEM

The backend system is the source where the data should be exported in the end. The backend systems are very different and the export format is normally XML and a visual representation of the form (PDF, PNG or similar). The backend system is also used when pre-populating data in the forms. The data is then exported from the system to the PrintProcessor during the printing process. Formidable system and the device.

LICENSE MANAGEMENT (D)

Formidable uses a license management system that secures an appropriate utilisation of licenses and pattern. New licenses and patterns are purchased through the XMS Penvision Partner Portal by uploading an order file from Formidable. The order file includes the license and pattern volume and is processed for the Formidable system that it originates from. A unique hardware id secures that only the original system can install the new licenses and patterns. By uploading the license file the Formidable system is populated with the new licenses and patterns.

Detailed overview of the Formidable system



Includes functionality from



MyScript®

For more information

For more details about Formidable, visit www.penvision.se



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