Web RePrice and MedFlow Bill Review
System Configuration and Requirements
# Table of Contents

I. Web RePrice Architecture ...................................................................... 3  
   A. SOAP .............................................................................................. 3  
   B. .NET ............................................................................................. 3  
   C. NHR MedFlow Manager ...................................................................... 3  
   D. Data Store ...................................................................................... 4  

II. Hosting Servers and Choosing Environments ............................................ 6  
   A. Hosting Servers ............................................................................... 6  
   B. Paperless or Paper Environment ......................................................... 6  

III. Bill Review Processor Workstation ........................................................... 7  
   A. Hardware Requirements .................................................................... 7  
   B. Software Requirements ..................................................................... 7  

IV. Scanning Workstation ............................................................................. 8  
   A. Hardware Requirements .................................................................... 8  
   B. Software Requirements ..................................................................... 9  

V. Application Server (if not hosted by NHR) ...............................................10  
   A. Hardware Requirements ...................................................................10  
   B. Software Requirements ...................................................................10  

VI. Database Server (if not hosted by NHR) .................................................12  
   A. Hardware Requirements ...................................................................12  
   B. Software Requirements ...................................................................12  

VII. Image Storage device (if not hosted by NHR) .........................................14  
   A. Hardware Requirements ...................................................................14  

VIII. Bandwidth Requirements .....................................................................15  
   A. Application and Database Server .......................................................15  
   B. Image Storage Device...................................................................... 15  

IX. Barcodes (paperless environment only)..................................................16  
   A. Hardware Requirements ...................................................................16  
   B. Software Requirements ...................................................................16  
   C. Software Requirements ...................................................................16  

X. AT&T – NHR Data Center Configuration ..................................................17  

XI. Multi-Client Co-Location Center Setup ....................................................18  

XII. Single-Client Co-Location Center Setup .................................................19  

XIII. Auto-Deploy and Update System.........................................................20
I. Web Reprice Architecture

NHR Web RePrice is an n-tiered web enabled application developed using the Windows-DNA (Distributed interNet Architecture). As such, all the benefits inherent with this distributed component based architectural approach are inherent to the Web RePrice application.

NHR Web RePrice is a paperless system. Optimal configuration is dual screen mode where the primary screen, a standard monitor, contains the Web enabled data entry GUI; the secondary screen, a flat panel, presents the document currently being worked with.

NHR Web RePrice makes use of the following additional architectural features to further enhance the n-tiered approach:

All data communication from Clients → Services tiers is via XML documents. This reduces OS overhead on application servers.

State and object caching dramatically reduces communication requirements while enhancing the power of business services tier side objects. This also makes the business services tier objects appear stateful and persistent to the programmer resulting in faster and less error prone development.

GUI is provided as a hybrid thin client often called Web Enhanced. This allows our product to deliver the flexibility and manageability of a web application with the rich GUI options provided by most desktop applications.

A. SOAP

SOAP (Simple Object Access Protocol) is used to conduct Remote Procedure Calls (RPC). As a result all communication to and from the client is done via HTTP. This eliminates most firewall issues and better support for COM+ automation for n-tier deployment.

B. .NET

.NET is Microsoft’s platform for XML Web services. XML Web services allow applications to communicate and share data over the Internet. This platform consists of a suite of tools built on XML and Internet industry standards that provide for each aspect of developing and using XML Web services. Web RePrice’s underlying design principles and architecture utilize the .NET paradigm.

C. NHR MedFlow Manager

The NHR MedFlow Manager makes use of a general finite state machine. This allows the use of finite state mathematics to business workflow processes. Some of the many benefits are: i) any workflow is representable, ii) at any step of a workflow there is no ambiguity as to what the subsequent possible steps are, iii) state machine mathematics often suggests simpler workflows equivalent to the original, iv) state machine mathematics generates simplified roll-up views which are guaranteed to be consistent with the original, and v) any required amount of history may be encoded into a state. Each document
is scanned into the system after a unique bar-code identifier (DocID) is attached which serves as the key to track the document.

D. Data Store

Web RePrice data-store uses the Open Database architecture. Currently the system is built using MS-SQL Server 2000 as the database. In addition, the system can be migrated to similar relational databases like Oracle or Sybase with relative ease. Internally, the data-architecture using the data machine concept, which is the fifth normal form data storage interface. Its primary use is to model complex data difficult to represent using a relational database. The DM consists of Data Entities, Root Nodes, Nodes, Profiles and Fields. A Data Entity is configured with data stored in database tables allowing new entity creation and dynamic modification of existing entities

Data is never deleted from NHR Web RePrice. Rather, NHR Web RePrice is an “as of” system. Each medium to high-level data-entity maintains its date-range of validity. This allows: i) the re-creation of any prior configuration, ii) pre-loading of data before it is valid, and iii) correct processing of old bills.
Web RePrice Architectural Model

**Data Store**
- Data Machine Entities
- High Level Data Entities
- Business Logic Support Data
- PPOs

**Application Server**
Support Client Server Communication via COM+ / XML, Object Caching, State Swapping and Load Balance

**Business Logic**
- Rules Engine, Flags Engine,
- MedFlow and Document Management

**Client**
- GUI controls give the look and feel of an application instead of a Web page.
- Provides document viewing and printing.

- All database clients reside on the application servers.
- All business logic and stateless processing will be done by server components on the app servers.
- Points (1) and (2) dramatically improve performance of remote clients.
- The development tools selected has given remote support of WAN nodes for free.
II. Hosting Servers and Choosing Environments

Web RePrice and MedFlow can be configured differently depending upon the client’s requirements. NHR can host the servers for the client, or the client company can host the servers. You can process your bills in a paper or paperless environment.

A. Hosting Servers

NHR can host the servers for the client, or the client company can host the servers.

1. NHR can host all servers

NHR, Inc. hosts and supports all production servers at AT&T’s professional data center in Manhattan. Web RePrice needs:

   a. Application server
   b. Database server
   c. Active Directory server

2. The client company can host these servers

The client can choose to host and support their own servers at their preferred location.

B. Paperless or Paper Environment

The client can process bills in a paper or paperless environment.

1. Process bills in a “paperless” environment.

All bills are scanned into the system and available online. Bill processors key in bill information from looking at the scanned bill on a monitor. A paperless environment requires the following items:

   NHR’s MedFlow software - an automated workflow software package:

   a. a second monitor where necessary (data entry stations from scanned images/bills)
   b. a second video card or a dual headed video card for above work stations
   c. a scanner and SCSI card
   d. a scanning Kofax key
   e. a network storage device


Bills are manually passed around the office and bill processors key in the data from the actual bill into Web RePrice.

   a. Using Web RePrice software only
III. Bill Review Processor Workstation

A. Hardware Requirements

1. Personal Computer - IBM or true IBM-compatible
   Minimum: P2-350
   Recommended: P3-500 or better

2. Memory
   Minimum: 64 megabytes
   Recommended: 128 megabytes or more

3. Hard disk
   Minimum: 12 MB of free space is required for the software
   Recommended: 12 MB of free space is required for the software

4. Monitor
   Minimum: 15-inch CRT color monitor
   Recommended: 17-inch CRT color monitor

5. Second Monitor: (optional for dual display systems)
   Minimum: 15-inch color monitor
   Dual or second video card (Matrox ME)
   Pivot software
   Recommended: Princeton LCD17 – 17-inch color flat panel
   Dual or second video card (Matrox ME)
   Pivot software

B. Software Requirements

   a. Dual Display system
      Minimum: 95, NT 2000 (Service Pack #2)
      Recommended: NT 2000 (Service Pack #2)
   b. Single Display system
      Minimum: 95, NT 4.0 (Service Pack #5)
      Recommended: NT 2000 (Service Pack #2)

2. Third Party Software
   a. Dual Display system
      Pivot software
   b. Both Display systems
      Internet Explorer 5.01 or higher
IV. Scanning Workstation

A. Hardware Requirements:

1. **Personal Computer - IBM or true IBM-compatible**
   - Minimum: P2-350
   - Recommended: P3-500 or better

2. **Memory**
   - Minimum: 64 megabytes
   - Recommended: 128 megabytes or more

3. **Hard disk**
   - Minimum: 12 MB of free space is required for the software and space for temporary images (per scanned batch). Space for temporary images can also be stored on image storage device.
   - Recommended: 12 MB of free space is required for the software and space for temporary images (per scanned batch). Temporary images are stored locally.

4. **Monitor**
   - Minimum: 15-inch CRT color monitor
   - Recommended: 17-inch CRT color monitor or better

5. **Second Monitor: (optional for dual display systems)**
   - Minimum: 15-inch color monitor
   - Dual or second video card (Matrox ME)
   - Pivot software
   - Recommended: 17-inch Princeton color flat panel
   - Dual or second video card (Matrox ME)
   - Pivot software

6. **Scanner**
   - Minimum: Fujitsu 3091
   - Or Fujitsu 3093 GX
   - Recommended: Bell & Howell 8080D (for high volume only)

7. **SCSI card**
   - Minimum: Standard SCSI card
   - Recommended: Adrenaline card by Kofax (high volume)
8. **Scanning License Key**

   Minimum: Kofax key using parallel port  
   Recommended: Kofax key using parallel port

   One time annual charge for monthly number of scans at the following volume levels:
   - 5,000 images per month
   - 25,000 images per month
   - 75,000 images per month
   - 200,000 images per month
   - Unlimited

B. **Software Requirements:**

   
   a. Dual Display system
      - Minimum: 95, NT 2000 (Service Pack #2)  
      - Recommended: NT 2000 (Service Pack #2)
   
   b. Single Display system
      - Minimum: 95, NT 4.0 (Service Pack #5)  
      - Recommended: NT 2000 (Service Pack #2)

2. **Third Party Software**
   
   a. Dual Display system
      - Pivot software
   
   b. Both Display systems
      - Internet Explorer 5.01 or higher
V. Application Server (if not hosted by NHR)

A. Hardware Requirements

1. Personal Computer - IBM or true IBM-compatible
   a. 1-25 users
      Minimum: P3-500 MHz dual processor
      Recommended: P3-500 MHz quad processor
   b. 26-50 users
      Minimum: P3-800 MHz quad processor
      Recommended: P3-1.26 GHz quad processor
   c. 51-100 users
      Minimum: P3-1.26 GHz Xeon quad processor
      Recommended: P3-1.26 GHz Xeon quad processor

2. Memory
   a. 1-25 users
      Minimum: 500 MB
      Recommended: 1 GB
   b. 26-50 users
      Minimum: 1 GB
      Recommended: 2 GB
   c. 51-100 users
      Minimum: 2 GB
      Recommended: 4 GB

3. Hard disk
   Minimum: 4 GB SCSI
   Recommended: 10 GB SCSI

4. Monitor
   Minimum: 15-inch CRT color monitor
   Recommended: 17-inch CRT color monitor

B. Software Requirements

   a. Dual Display system
      Minimum: 95, NT 2000 (Service Pack #2)
      Recommended: NT 2000 (Service Pack #2)
   b. Single Display system
      Minimum: 95, NT 4.0 (Service Pack #5)
      Recommended: NT 2000 (Service Pack #2)

2. Third Party Software
   a. Dual Display system
      Pivot software
b. Both Display systems
   Internet Explorer 5.01 or higher
VI. Database Server (if not hosted by NHR)

A. Hardware Requirements:

1. Personal Computer - IBM or true IBM-compatible
   a. 1-25 users
      Minimum: P3-500 MHz dual processor
      Recommended: P3-500 MHz quad processor
   b. 26-50 users
      Minimum: P3-800 MHz quad processor
      Recommended: P3-1.26 GHz quad processor
   c. 51-100 users
      Minimum: P3-1.26 GHz Xeon quad processor
      Recommended: P3-1.26 GHz Xeon quad processor

2. Memory
   a. 1-25 users
      Minimum: 500 MB
      Recommended: 1 GB
   b. 26-50 users
      Minimum: 1 GB
      Recommended: 2 GB
   c. 51-100 users
      Minimum: 2 GB
      Recommended: 4 GB

3. Hard disk
   Minimum: 10 GB SCSI
   Recommended: 40 GB Raid 5 / Snap Server

4. Monitor
   Minimum: 15-inch CRT color monitor
   Recommended: 17-inch CRT color monitor

B. Software Requirements

   a. Dual Display system
      Minimum: 95, NT 2000 (Service Pack #2)
      Recommended: NT 2000 (Service Pack #2)
   b. Single Display system
      Minimum: 95, NT 4.0 (Service Pack #5)
      Recommended: NT 2000 (Service Pack #2)

2. Third Party Software
   a. Dual Display system
      Pivot software
b. Both Display systems
   Internet Explorer 5.01 or higher
VII. Image Storage device (if not hosted by NHR)

A. Hardware Requirements
Any network-available storage device, stand alone or part of existing system. Each page scanned at 200 dpi averages 50k.

1. Hard disk
   Minimum: See formula
   Recommended: RAID 5 / Snap Server

   (Formula)
   Multiply:
   - # of bills per month times
   - avg. # pages per bill times
   - # of months for images to remain online (not archived)
   times
   50K equals
   number of kilobytes for storage
VIII. Bandwidth Requirements

A. Application and Database Server
   Minimum: TBD
   Recommended: TBD

B. Image Storage Device
   Minimum: TBD
   Recommended: TBD

<table>
<thead>
<tr>
<th>Frame Capability</th>
<th>pipe size</th>
<th># bills/day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>64</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>128</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>192</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>256</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>384</td>
<td>600</td>
</tr>
<tr>
<td></td>
<td>512</td>
<td>800</td>
</tr>
<tr>
<td></td>
<td>768</td>
<td>1200</td>
</tr>
<tr>
<td></td>
<td>1024</td>
<td>1600</td>
</tr>
<tr>
<td></td>
<td>1536</td>
<td>2400</td>
</tr>
</tbody>
</table>
IX. Barcodes (paperless environment only)

A. Labels
Standard NHR labels for application are available from:
  Advanced Barcode & Label (770) 564-2354
  Contact Joe Bastow
Otherwise:
  a. 1.5" left to right
  b. 1" tall top to bottom
  c. 9-digit code including two-letter prefix for each site (unique per site).
  d. Code 128 labels

B. Labels Applicator
The applicator must be the correct size to work with the labels:
  Raco Industries.
  Contact is Kevin Gibson (800) 446-1991.
  Item: Towa AP-65-60

C. Barcode Scanner
Zebex Industries Inc. ZB-2200AM
X. AT&T – NHR Data Center Configuration

National Healthcare Resources
WebReprice
Physical Connectivity Diagram

[Diagram depicting network connectivity with various devices and connections, including routers, switches, firewalls, and servers, labeled with VLAN 1, 2, and VLAN 3, 4, 5.]
XI. Multi-Client Co-Location Center Setup

WebReprice Multi-Clients and COLO Center Setup

[Diagram of a network setup including dual screen workstations, scanner, image storage, network, firewall, router, colocation (COLO) center, and client connections.]
XII. Single-Client Co-Location Center Setup

WebReprice Single-Client at Multi-Locations
XIII. Auto-Deploy and Update System

The Auto-Deploy and Update (ADU) system of Web RePrice supports mass deployment and keeps all installed versions up-to-date. Web RePrice exists in at least three separate environments: Production, QA, and Development. Along with those three environments are three different flavors of Web RePrice. Due to the different versions of Web RePrice, deployment must be machine-centric. The ActiveX control will be embedded within the primary web page for Web RePrice.

Due to the file structure of Web RePrice, one can simply make a collection of files (groups) and copy them directly onto a users machine. By using the binary compatibility property, simply overwriting the old file with a new one (same name) is enough to update the components. This is possible because components can be compiled with binary compatibility, hence maintaining the GUID (Global Unique IDentifier). Using the WinAPI, the control will retrieve the machine name and the version numbers of the individual files within that specific group. The ActiveX control queries the database based on machine name. Once the record-set is loaded, the control will compare the version numbers stored in the database to the file version numbers. If the file version numbers are less than the databases numbers, the group containing the file is installed.

A. Steps in Setup for Automated Deployment and Update

1. Create groups containing Web RePrice components based on functional similarities.
2. Create database tables with a Users data, Setup URLs, Most Recent Group (component) versions, and other deployment information.
3. Retrieve version information from users machine using the Verify page, which gathers the Machine Name and Current versions of groups.

B. Deployment and Update

Firstly, ADU checks if the user is Valid (e.g. is registered with the RP_CONFIG database). If not valid then the user is denied access and has to be added and given rights to the appropriate environments.

Possible scenarios with a valid user are:

1. A machine with no prior Web RePrice installation
2. A machine with a prior Web RePrice installation
3. A machine with the current Web RePrice installation

Scenario 1: Machine with no prior Web RePrice installation

When the user first goes to the Web RePrice website the Verify page will check for the existence of the User and Machine - using the Verify process - which checks using the database. If Verify determines that there is no prior Web RePrice installation on the PC, the page will fire the link for the
Web RePrice Setup. This will automatically run the full Web RePrice installation.

Scenario 2: Machine with a prior Web RePrice installation
If Verify determines that the machine has a version of Web RePrice and its components. The Verify page will query the database and obtain the latest version numbers for the groups. If the query returns outdated group version numbers, the outdated groups will be installed on the users machine and the cookie and database are updated.

Scenario 3: Machine with the current Web RePrice
If Verify determines that the WRP install exists and the group version numbers match the database, the page is displayed with no actions, and awaits the user to select a link.

In conclusion, the Auto Deploy and Update system is able to manage the versions of different installations and serves as a quick and autonomous global dispersal of Web RePrice and its components over the Intranet/WAN and eventually the NHR Co-Location Facility.