Registry Plus Central Registry Tools Systems and IT Personnel Requirements

Centers for Disease Control and Prevention

National Center for Chronic Disease Prevention and Health Promotion

Division of Cancer Prevention and Control

National Program of Cancer Registries

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Contents

Central Registry System (CRS) Plus

Central Registry System (CRS) Plus is a client-server application that stores the registry database on a server computer and runs the client application on individual workstations. As part of the installation package, CRS Plus comes with Microsoft® Access as the default database. To be fully functional, the registry database must be moved to a Microsoft SQL Server before implementing the production environment.

System Requirements

Database Server

The table below lists specifications for the database server that is assumed to be installed within an existing, larger information technology (IT) infrastructure with connectivity, security, and operational features established by local policy.

Note: The specification above is for a dedicated server only. If other services and applications are running on this server, additional RAM and hard disk space may be required.

System Component	Specification
RAM	2 GB; more memory will result in better performance
Hard disk	RAID-5 for data, RAID-1 for log files
Size of data file	(3 * 7000 * estimated_number_of_cases) ÷ 1048576 MB
Size of transaction log file	25% of the data file size
System drive for caching	At least 2 GB of free space
CPU	Dual processor with latest speed
Operating system	Microsoft Windows® Server 2000/2003/2008 (Server 2008 Enterprise will meet the NIST FIPS 140-2 standard)
Database server	SQL 2000/2005/2008

Client Computers

The table below lists specifications for the client computers.

System Component	Specification
RAM	500 MB or more
Hard disk	200 MB of free space
Operating system	Microsoft Windows 2000/XP/Vista/7
Database	Microsoft Access 2000 or later. Make sure scripts are permitted to execute.

Installation

You should have received the FTP site and file information in an e-mail from CDC. Download the installation file from the FTP site, double-click the file name to start the installation wizard, and follow the screen prompts to complete the installation. To start CRS Plus after installation, open the Windows Start menu and select All Programs, Registry Plus, CRS Plus.

Important: Although by default the standard installation works with the Microsoft Access database that is packaged with the installation file, CRS Plus is designed to work with a Microsoft SQL Server database. To configure CRS Plus to work with a Microsoft SQL Server database, complete the following steps.

If you have questions about setting up CRS Plus, send e-mail to cdcinfo@cdc.gov.

1. Prepare your database on the Microsoft SQL Server.

    a. Create a database and database user account(s) on the Microsoft SQL Server; the user account should have both read and write access to the database.

    b. Import all tables from C:\RegPlus\CRSPlus\MDBS\Registry200.mdb to the new database.

    c. Refer to the instructions in “CRS Plus Indexes.doc” located in the C:\RegPlus\CRSPlus folder to create indexes on the tables.

2. Change the CRSPlus.ini file.

    a. Open the CRSPlus.ini file in the C:\Windows directory.

        i. Change the database mode to client/server.

        ii. Remove REM: from the second line (RegDBMode=Client Server).

        iii. Add REM: to the beginning of the third line (RegDBMode=File Server).

        iv. Add REM: to the following line in the [DATABASE] section: Registry=Provider=Microsoft.Jet.OLEDB.4.0;DATA SOURCE=c:\regplus\crsplus\mdbs\registry2000.mdb.

3. Configure the connection string. Two sample connection strings are at the bottom of the CRSPlus.ini file to connect to the Microsoft SQL Server database: one using integrated security and the other using SQL Server authentication. Depending on your organization's practice—

    a. Select the appropriate connection string type.
    b. Modify the parameters to match your setting.
    c. Remove the REM: from the connection string.

Prep Plus

Prep Plus is a program for the central registry that receives North American Association of Central Cancer Registries (NAACCR)-formatted abstracts from Abstract Plus or any hospital-based software that can produce the NAACCR record format, and incorporates them into the central database.

Prep Plus can run in file-server or client-server mode, and stores tracking information in a database. In client-server mode, Prep Plus needs a database server to host the tracking database. This database can be hosted on the same server that hosts the CRS Plus database. If Prep Plus is running in file-server mode, the Microsoft Access tracking database can be put on a shared network drive.

System Requirements

Database Server

The server used for the CRS Plus database also can be used for the Prep Plus database. Some local temporary Microsoft Access databases can be located either on the client computers or on a shared network drive. Space also is required on the shared drive to store text data files. The space required on the shared drive depends on the amount of data the central registry receives each year and how often the drives are archived.

Client Computers

The table below lists specifications for the client computers.

System Component	Specification
RAM	500 MB or more
Hard disk	200 MB of free space
Operating system	Microsoft Windows 2000/XP/Vista/7
Database	Microsoft Access 2000 or later

Installation

Downloading the installation file from the FTP site, double-click the file name to start the installation wizard, and follow the screen prompts to complete the installation. To start Prep Plus after installation, open the Windows Start menu and select All Programs, Registry Plus, Prep Plus.

To use Prep Plus in a networked environment, modify PrepPlus.ini (in the C:\Windows folder) to point several folder paths and databases to shared network drives instead of local drives. The PrepPlus.ini file includes comments about how to make the changes.

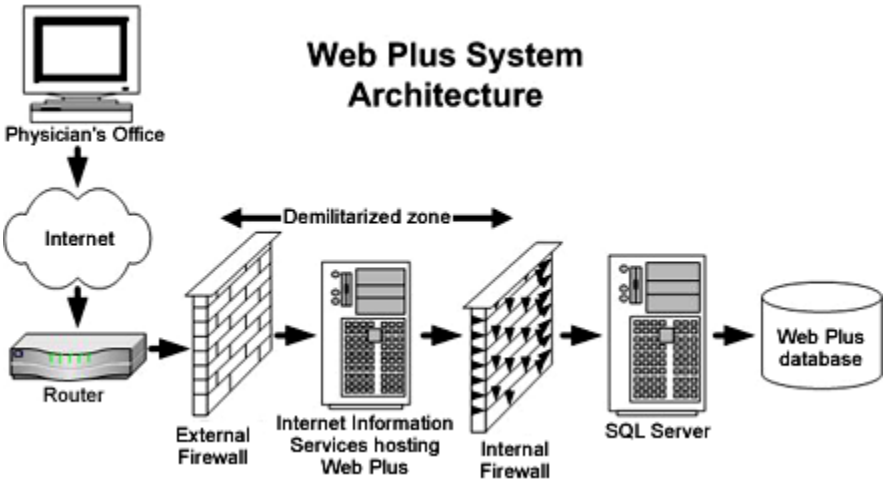
If you have questions about setting up Prep Plus, send e-mail to cdcinfo@cdc.gov.

Web Plus

Web Plus is a Web-based application that collects cancer data securely over the Internet. Web Plus is most suited for physicians' offices and other low-volume reporting sources that do not have facility-based cancer registries. Records are saved in a database at the hosting central registry, and cases entered by one facility or office are not visible to other facilities. Data entered is validated by the NPCR–EDITS engine. Users, display types, and edit configurations are managed at the hosting central registry. Web Plus is hosted on a secure Web server that has a digital certificate installed; the communication between the client and the server is encrypted with Secure Sockets Layer (SSL) technology.

System Requirements

Web Plus runs on Microsoft Internet Information Services (IIS) and stores data in a Microsoft SQL Server database. The application needs to be accessible from the public Internet with support for encrypted communication between clients and the Web server. Typically, one server hosts the application and another runs SQL Server. The Web server is placed in the demilitarized zone between the external and internal firewalls, while the SQL Server sits behind the internal firewall as part of the internal trusted network, as shown below.



A router connects the demilitarized zone to the Internet. An SSL digital certificate is installed on the Web server for site authentication and encryption of data transferred between the clients and the Web server. The digital certificate can be created internally if a certificate server is available, or it can be purchased from a vendor. The organization needs to register a domain name if it has not done so already.

The table below lists specifications for Web server and database server computers, which are assumed to be installed within an existing, larger IT infrastructure with connectivity, security, and operational features established by local policy.

System Component	Web Server	Database Server
Processor	Dual processor with latest speed	Dual processor with latest speed
RAM	500 MB	500 MB
Hard disk	At least 500 MB of free space	At least 500 MB of free space
Operating system	Microsoft Windows 2000 Server or later	Microsoft Windows 2000 Server or later
Microsoft IIS	Version 5 or later	Not applicable
.NET Framework	Version 1.1	Not applicable

System Component	Web Server	Database Server
SQL Server	Not applicable	Microsoft SQL Server 2000 (standard edition) or later
Comments	Install the SSL digital certificate on this server.	Fault-tolerant disks are recommended for the database. The RAM and hard disk free space requirements may increase if this server also hosts databases for other applications.

Security Features

Web Plus is a highly secure application that can be used to transmit confidential patient data between reporting locations and a central registry safely over the public Internet. Security is achieved by a combination of software features and network infrastructure.

The security of Web Plus depends mostly on the security of the client computer, the communication channel between the client and the Web server, the Web server, the base operating system, and the configurations of the firewalls on either side of the Web server. It is very important that the hosting agency have a security policy in place and document the users (and their assigned roles) who have access to Web Plus. The hosting agency is responsible for encrypting the Web Plus database if required. Strong passwords are recommended, and account sharing should be prohibited.

For further information, visit Web Plus Security Features (http://www.cdc.gov/cancer/npcr/tools/registryplus/wp_security.htm) and Maximizing Data Security in Web Plus (http://www.cdc.gov/cancer/npcr/tools/registryplus/wp_security2.htm).

Installation

Important: Web Plus has not been tested in a load-balanced environment. Please contact NPCR if you want to test it in this environment. Microsoft Windows 2003 Server or later operating system is recommended because of improved security and stability.

1. Install a Web server on your network that contains IIS and .NET Framework version 2.0. If you are using Microsoft Windows 2003 or later, change your server configuration to add the Web server (IIS) role and enable it to run ASP.NET applications. This Web server should have proper connectivity to a SQL Server machine (SQL Server and Web server can be located on the same machine for testing).

    a. Create a user account (SQL Server account or Windows domain account) on the SQL Server for all Web Plus users to access the Web Plus database from the application.

    b. If the Web server is outside the firewall and the SQL Server is inside the firewall, open appropriate ports on the firewall to allow the Web server and the SQL Server communicate.

2. Download the Web Plus files (the file name is in the e-mail you received from CDC) from the Web Plus folder on the CDC FTP site.

3. Unzip the downloaded file to a temporary folder.

4. Create and configure the database for Web Plus on the database server.

    Note: These instructions are for Microsoft SQL Server 2000 and later versions. A version of Web Plus is available that works with My SQL Server; however, not all functions of the application have been tested to work correctly with this database. If you are using a My SQL Server database, download the My SQL Server version of Web Plus. Create the Web Plus database

from the data file in the Web Plus\data folder and update the database connection string in the Web.config file in the Web Plus folder to point to this database.

a. Create the Web Plus database from the SQL Server backup in the WebPlusV2\Data folder.

b. Grant the “datareader” and “datawriter” roles to the Web Plus user account; also grant this account execute permission on the stored procedures “lookupuser,” “getsetbaseid,” and “initializelargeobjectstableforinsert.”

5. Set up Web Plus on the Web server. The steps for this task differ depending on the operating system on the Web server. Please locate the section for the operating system you have on the Web server and follow the steps described in that section.

Microsoft Windows 2008 and Windows Vista Server

a. Create a folder on the Web server and copy all unzipped files and subfolders from the temporary folder created in step 3 to this folder on the server.

b. Open the Web.config file in the folder above and change the “dbconnection” key value under “appsettings” to point to your SQL Server database and the “SMTPserver” value to your SMTP server IP address.

c. Using IIS Manager, add an application folder under Default Web site. In the dialog box, specify an alias (such as Web Plus), select the preconfigured Classic Application Pool or another application pool you may have created for Web Plus, and the physical path of the Web Plus folder created in step 5.a above. If multiple Web applications are running on this Web server, create a separate application pool for Web Plus to isolate it from other applications.

d. From the Basic Settings menu of the application pool, select the application pool to which Web Plus belongs and set it to run .NET Framework version 2.0 in the Classic Pipeline mode.

e. From the Recycling menu of the application pool, select the application pool to which Web Plus belongs, set the recycling conditions to recycle at a specific time (preferably sometime after midnight when no one uses the application), and uncheck all other recycling conditions.

f. From the Advanced Settings menu of the application pool, in the Process Model group, set the Idle time-out option to 0 to disable worker process timeout.

g. If you are using a Microsoft Windows 2008 64-bit server, set the application pool to run 32-bit application in the Advanced Settings menu of the application pool.

Microsoft Windows 2003 and Windows XP Server

Note: If you are using Windows XP, complete steps a–c only.

a. Create a folder on the Web server and copy all unzipped files and subfolders from the temporary folder created in step 3 to this folder on the server.

b. Open the Web.config file in the folder above and change the “dbconnection” key value under “appsettings” to point to your SQL Server database and the “SMTPserver” value to your SMTP server IP address.

c. Create a new virtual directory under Default Web Site, specify an alias name (such as Web Plus), point to the physical path of the Web Plus folder created in step a above, and allow read and run script permissions on the virtual folder.

d. Open the Properties dialog box of the virtual directory created in step b and set its Application Pool property to the application pool you may have created for Web Plus. If multiple Web applications are running on this Web server, create a separate application pool for Web Plus to isolate it from other applications. DefaultAppPool is selected by default. In the Properties dialog box, select the ASP.NET tab; then select ASP.NET version 2.x. If the Properties dialog box does not have an ASP.NET tab, .NET Framework v2.x may not be installed on the server.

e. Select the application pool to which Web Plus belongs, open the Properties dialog box, and set the properties as follows:

- Under the Recycling tab, uncheck the "Recycle worker processes (in minutes)" and "Recycle worker processes (number of requests)" checkboxes; then check the "Recycle worker processes at the following times" checkbox and specify the time when the worker process can be recycled safely (preferably sometime after midnight). Uncheck both checkboxes under the Memory Recycle group.

- Under the Performance tab, uncheck the idle timeout option.

6. In Services, set the ASP.NET State Service to start automatically. Web Plus stores session variables in the State Server.

7. Test Web Plus. Enter http://*webserveraddress/virtual_folder*/logonen.aspx in the address bar of a browser. Enter "johndoe" as the user ID and "abstractor" as the password.

8. Install the Web Plus Administration Tool on the central registry administrator's computer.

Administration Tool

Abstracts that are entered, completed, and released via Web Plus are stored in the SQL database that resides inside the internal firewall. Files of abstracts that are uploaded via Web Plus also are stored in the SQL database. Abstracts and uploaded files (bundle submissions) need to be exported from the SQL database so that they can be imported into the central cancer registry database.

Because Web Plus runs on a Web server that sits outside the internal firewall, a separate Windows application exports files of abstracts and uploaded files for enhanced security and performance. This application, called the Web Plus Administration Tool, runs in the same LAN where the Web Plus database resides, so files can be exported from the database quickly. In addition, the Web Plus Administration Tool provides an added layer of security: it can connect to the database only when it is running inside the firewall, so access to the export function is limited to local users only.

The Web Plus Administration Tool also can be used to run scheduled batch edits on uploaded files, and run edits manually on any uploaded file in NAACCR file format.

Administration Tool Installation

To install the Web Plus Administration Tool on the central registry administrator's computer, complete the following steps. The installer must have administrative rights to the computer, and .NET Framework version 1.1 must be installed on the computer.

1. Download the Web Plus Administration Tool install program from the CDC FTP site. You should have received the folder and the name of the latest installation file in an e-mail from CDC.

2. Double-click the install program file to begin the installation process, and follow the screen prompts to complete the installation.

3. Locate the Web Plus.ini file in the C:\Windows folder and update the database connection string to point to your Web Plus database.

Initial Login to the Web Plus Administration Tool

1. To start the Web Plus Administration Tool, open the Windows Start menu and select All Programs, Web Plus Administration, Batch Processing.

2. Upon initial login, the server Log In dialog box opens.

Field	What to Enter
Server	Name or IP address of SQL Server
Database	Name of SQL database
UserID	SQL Server login ID
Password	Password for SQL Server
NW Library	Select a network library to use (named Pipe or TCP/IP)
Port	Enter the port number SQL Server listens on (1433 is the default)
Use Windows Authentication	Check this box if you are using Microsoft Windows authentication. If this box is checked, the UserID and password are not needed.

3. Obtain the information above from the SQL database administrator. Fill in the fields and click **Login.**

4. When you start the Web Plus Administration Tool in the future, only the central registry administrator's user ID and password are needed.

Electronic Mapping, Reporting, and Coding (eMaRC) Plus

Electronic Mapping, Reporting, and Coding (eMaRC) Plus is a file mapping tool that is used to view and work with pathology lab files in HL7 or pipe-delimited format. The application imports HL7 files manually or directly from a PHIN Messaging System (PHINMS) queue, and checks the messages for required data items. eMaRC Plus searches for cancer terms to mark potential cancer cases, and builds a pathology lab database in Microsoft Access, SQL Server, Oracle, or Sybase format.

eMaRC Plus reads HL7 version 2.3.1 ORU^01 message batch files, parses messages, and stores HL7 data elements as discrete field values in tables in the pathology lab database. Typically, the PHINMS is used to send HL7 batch files from a laboratory to a cancer registry or another agency working for the cancer registry. From a workstation at a cancer registry, eMaRC Plus processes files as they arrive in the PHINMS receiver's worker queue. eMaRC Plus also can be used to import files into the pathology lab database manually.

During import, eMaRC Plus searches a terms table for potential cancer reports; a negation terms finder algorithm (NegEx) enhances the program’s text mining capabilities. eMaRC Plus shows imported pathology reports with cancer terms highlighted in red and negated terms highlighted in blue. Both the terms table and the negation phrases table are customizable.

eMaRC Plus also creates partial abstracts from HL7 messages during import, translating coded values from the HL7 coding standard to the NAACCR standard. It provides a function to view the pathology report's data items from the HL7 message and the abstract's data items side-by-side on the screen, and allows the user to look at the pathology report text and code data items in partial abstracts. The new auto-code histology feature suggests pertinent histology codes while the user codes abstracts.

System Requirements

The table below lists specifications for the client computer on which eMaRC Plus is installed. If you use a database other than Microsoft Access, you will need a server computer to host the database. This database can be put on the same server that hosts CRS Plus, Prep Plus, and Web Plus databases.

System Component	Specification
RAM	500 MB or more
Hard disk	200 MB of free space
Operating system	Microsoft Windows XP or later
.NET framework	Version 2 or later

Installation or Upgrade

If a previous version of eMaRC Plus (or Mapper Plus as it was previously named) is installed, uninstall the previous version before installing the new version. eMaRC Plus requires Microsoft .NET Framework 2.0 or above to be installed on the computer. If you are using a database other than Microsoft SQL Server or Access, you may also need to install client connectivity software; please refer to your database management system documentation for any client components needed.

Download the installation file from the FTP site you received in an e-mail from CDC, and double-click the file name to install the program. To start eMaRC Plus, open the Windows Start menu and select All Programs, Registry Plus, eMaRC Plus, eMaRC Plus.

If you are upgrading from a previous version, you may need to run database scripts to update the pathology database. Please refer to the release notes in the installation file to determine what database scripts you need to run.

This installation package contains pathlab.mdb, which is the starter Microsoft Access database to store pathology data. eMaRC Plus is configured to use this database by default. To create initial database objects in other database management systems, SQL scripts are included in the C:\eMaRCPlus\dbscripts folder. You also may have received an e-mail telling you where to get the latest database scripts to create initial databases in different database systems.

The PATHLAB Database

eMaRC Plus imports HL7 batch files, parses the messages, and stores HL7 data elements in tables in the PATHLAB database. A mapping table called DATAMAP contains the mapping of HL7 data elements to fields of tables (refer to Local Customization below to see how registries can use this table to select additional data items for storage). There are seven data tables, MSH, PV1, PID, ORC, OBR, OBX, and OBXCOMBINEDTEXT, the first six of which correspond to the six segments of the ORU^01 message. Data elements can be stored at the field, component, or subcomponent level. The hierarchical relationships among segments are maintained in the database.

To simplify processing and use of text data, the text field (OBX-5) of all OBX segments that belong to an OBR segment are combined and inserted as one row in the OBXCOMBINEDTEXT table. This table has eight fields to store text of the OBX segments, and depending on the LOINC code in the OBX-3 field, the text of OBX-5 is stored in one of these eight text fields.

Raw HL7 messages also are saved to the HL7MESSAGES table.

Supported Database Types

eMaRC Plus has been tested to run on Microsoft Access, Microsoft SQL Server, Sybase Anywhere, and Oracle database management systems. When initially installed, by default eMaRC Plus is configured to use the Access database that is packaged with the installation file. The Access database is fine for evaluating the program, but the PATHLAB database should be put on a more robust relational database management system for production.

Configuration

eMaRC Plus' default settings allow it to run immediately upon installation. Before using this program in production, change the configuration to suit your environment and preferences.

The configurations are set in the Configuration dialog box, which can be accessed from the System Configuration menu item in the Administration menu. The following options can be set:

1. **Database Type:** Select the desired database type from the drop-down list. Your choices are Microsoft Access, Microsoft SQL Server, Sybase Anywhere, and Oracle.

2. **Pathology Reports Database Connection String:** OLEDB connection string to the Pathology Reports database, the main database that stores imported messages and parsed data values from messages. This database also contains the DATAMAP table, lookup tables, translation tables, and other parameter tables. The default value is the Access database Pathlab.mdb, which is included with the installation. eMaRC Plus uses the database-specific OLEDB library to connect to the database. Refer to your database management system's resources to find the OLEDB connection string. Sample connection strings for different database management systems are listed below.

   Microsoft SQL Server:
   PROVIDER=SQLOLEDB;SERVER=servername;DATABASE=pathdb;UID=pathdb;PWD=****;

   Oracle: Data Source=XE;User Id=phinuser;Password=*****;

   Microsoft Access: Provider=Microsoft.Jet.OLEDB.4.0;Data

Source=c:\mapperplus\pathlab.mdb;User Id=admin;Password=;Mode=Share Deny None;

SQL Anywhere: Data Source=Pathlab;UID=DBA;PWD=***

3. **PHIN Worker Queue Connection String:** The PHINMS worker queue is located in this database, which can be any OLEDB-compliant database. The default value is the Access database Phinms.mdb, which is included with the installation. Pathology reports and the PHIN worker queue can be the same database, in which case both connection strings will be the same. Refer to your database management system's resources to find the OLEDB connection string. A sample connection string for Microsoft SQL Server is listed below; connection strings for other database management systems are the same as in step 2.

   Microsoft SQL Server:
   PROVIDER=SQLOLEDB;SERVER=servername;DATABASE=pathdb;UID=pathdburs;PWD=****;

4. **Worker Queue Name:** Enter the PHINMS Worker Queue name; for example, ELRWorker Queue. Please check with your PHNMS implementation team to find what the queue name is.

5. **PHINMS File Receive Folder Path:** If your PHINMS receiver has been configured to put received files in a disk folder, enter the folder path where the received files will be stored. The preferred setting in the PHINMS Receiver is to leave the file in the message queue table in the database rather than store it on a disk folder.

6. **Read File from the PHIN MS Queue:** This is the default and preferred option. Select this option to make the program read the incoming file from the worker queue.

7. **Service Code:** Enter the service code to identify the file in the PHINMS worker queue; for example, ELR_HL7231. Please check with your PHNMS implementation team to find what your service code is.

8. **Archive Folder:** eMaRC Plus copies the imported file to this folder before processing it.

9. **Cancer Terms Search Options:** Available under the Reports Filtering and Auto-coding tab.

   - **Write all cases to the database without filtering:** This option writes all messages to the database without searching for cancer terms in the OBX texts.

   - **Write all cases to the database and flag non-reportable cases:** This option writes all messages to the database, but non-reportable reports are flagged with a different status code.

   - **Write only reportable cases to the database:** This option excludes messages that do not have cancer terms in their OBX texts.

10. **Text Sections to Search for Filtering:** Check the sections you want eMaRC Plus to search for cancer terms. By default, all sections are checked.

11. **Text Sections to Search for Auto-Coding:** Check the sections you want eMaRC Plus to examine to suggest histology codes. By default, all sections are checked.

Local Customization

Registries can customize eMaRC Plus to change the data items that are stored as discrete fields in the database tables and whether data items are required.

DATAMAP table: eMaRC Plus looks to this table to find which HL7 data elements are stored in which fields of data tables. Many of the fields in this table are for documentation only. The following fields are used for site-specific configuration:

DataTableName: Enter the name of the table in which the HL7 data element is stored. MSH, PV1, PID, ORC, OBR, and OBX are valid values.

DataFieldName: Enter the name of the field in which the HL7 data element is stored. The field should exist in the table.

NAACCROpt_xxxx: This column defines whether data elements are required (R), required when available (R*), or optional (O). You can have a separate optionality column for each laboratory from which your site receives messages. Use the PREFERENCES table to show which laboratory uses which optionality column.

For example, if you decide to store PID.3.4 as a separate entity in the database, follow these steps:

1. Open the DATAMAP table and locate PID.3.4 under HL7Element.
2. Enter PID under DataTableName.
3. Enter AssigningAuthority (or any other name that is meaningful to you) under DataFieldName.
4. Update the optionality column for each laboratory if necessary.
5. Update the Length field to indicate the maximum length for this field.
6. Open the PID table in the design view and add a field called AssigningAuthority to this table with a text datatype text (or varchar depending on the database you are using) and the field length specified in step 5 above.

PREFERENCES table: This table maps laboratories to the optionality columns in the DATAMAP table.

IT Personnel Requirements to Support Registry Plus Central Registry Tools

The central registry needs personnel with experience in the following areas to support Web Plus, eMaRC Plus, Prep Plus, and CRS Plus:

- Server Administration
- General IT Support
- Database Administration
- Network Security and Web Administration

Server Administration

Each registry **must** have access to server support personnel. They are involved extensively in the initial setup of all servers, and involved initially in establishing application connectivity. The time required depends on your infrastructure, policy, and server environment.

- Set up the server initially (if necessary)
- Manage the server operating system
- Test and deploy server hardware and software
- Profile and monitor servers
- Maintain server performance
- Help oversee the physical security, integrity, and safety of the server environment

General IT Support

Each registry **must** have access to readily available IT support personnel who can perform a variety of basic tasks. These tasks typically take about 30 minutes, although initial application setup may take longer. One person should be able perform these tasks. Expect about 32 hours during startup or conversion, and four hours per month on an ongoing basis.

Installing and Upgrading Desktop Applications

CRS Plus, Prep Plus, and eMaRC Plus are installed on workstations. The responsible IT personnel need administrative rights to install and upgrade applications on users' computers. They also should be able to download files from CDC's FTP site.

Running Database Scripts and Performing Minor Database Changes

Some upgrades may require database changes; NPCR will send the scripts and procedures required to make these changes. The responsible IT personnel should be able to run the scripts and change databases using SQL Management Studio. Ideally, they also can write simple SQL scripts to satisfy data requests from registry users.

Database Administration

Each registry **must** have access to an experienced database administrator. This person is involved extensively during initial application setup. Afterward, he or she maintains and backs up the database regularly, following the practice of the local data processing center. He or she also should be able to write more complicated SQL scripts for specialized extracts and reports. Expect about eight hours during startup or conversion, and four hours per month on an ongoing basis.

For the initial setup, databases need to be created on a Microsoft SQL Server. These databases require regular maintenance and backups. The responsible IT personnel should be able to write SQL scripts to get counts, create specialized extracts, and perform database updates in response to user requests.

Network Security and Web Administration

Each registry that uses Web Plus **must** have access to Web administration and security personnel. When Web Plus is set up initially, they work together to establish connectivity with the database and mail server. Initial setup typically takes four hours if operating systems are installed and connected to the network. Application upgrades can be done in less than an hour. During startup or conversion, expect four hours each of support from network and security, Web administrator, and database administrator personnel. Expect about two hours per month of Web administrator and database administrator support on an ongoing basis.

Setting Up and Upgrading Web Plus on the Web Server

The responsible IT personnel should be able to set up Web Plus in IIS, perform upgrades as new versions are released, and upgrade the Microsoft .NET Framework as new versions are released and recommended by NPCR.

Optional: Writing Special Programs

If you need special reports that CRS Plus and Prep Plus don't provide, the registry may need a programmer to work with files and data outside the normal data flow.

Optional: Installing and Administering Applications on the Terminal Server

CRS Plus, Prep Plus, and eMaRC Plus can be installed in the terminal server environment (Microsoft Windows terminal server or Citrix application server), which eliminates the need to install these applications on individual workstations. Because of reduced need for IT support, installing applications in the terminal server environment is recommended if such an environment is available.

If applications are installed on the terminal server, administrators should be available for application upgrades and account maintenance on the terminal server. Expect eight hours of terminal server administrator support during startup or conversion, and four hours per month on an ongoing basis.