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## **NEXT GENERATION CODIS**

# **CODIS 7.0 HARDWARE AND SOFTWARE RECOMMENDATION GUIDE**

**CODIS7.0-HSRG-VER1.1  
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## 1.0 OVERVIEW

The purpose of this document is to describe the hardware and software specifications for the CODIS 7.0 application. The *CODIS 7.0 Hardware and Software Recommendation Guide* (HSRG) documents the CODIS 7.0 application performance requirements and details how each requirement is met. Large labs are required to use the 64bit Windows OS and 64bit SQL Server to meet requirements. The number of specimens per lab size is assumed to be as follows:

- Small Labs (less than 2 million specimens)
- Medium Labs (between 2 million and 5 million specimens)
- Large Labs (between 5 million and 50 million specimens)

## 2.0 SERVER & CLIENT HARDWARE REQUIREMENTS

### 2.1 Hardware Requirements

The recommendations in this section must be closely followed to ensure successful installation and deployment of CODIS7.0 server and client software. Labs must monitor the number of specimen profiles and plan for any increases when purchasing hardware and software over a three year timeframe. The HSRG does not endorse any particular hardware vendor; however, labs should select vendors that either meet or exceed the CODIS 7.0 hardware requirements. Tables 2.1-1 and 2.1-2 provide the server and client hardware requirements.

#### 2.1.1 Server Hardware Requirements

CODIS 7.0 Hardware Requirements			
	Server (large labs) <sup>1</sup>	Server (medium labs)	Server (small labs)
<b>Processor</b>	8 2.8GHz AMD Opteron Dual-core processors 2.8 GHz	Dual Core Intel® Xeon® 3.33GHz	Dual Core Intel® Xeon® 3.33GHz
<b>Memory</b>	128GB	8GB	4GB
<b>Hard Disk RAID</b>	RAID 5 Integrated SAS 15K drives	RAID 5 Integrated SAS 15K drives	RAID 5 Integrated SAS 15K drives
<b>1<sup>st</sup> Hard Disk</b>	1.0TB Serial-Attach SCSI	300GB Serial-Attach SCSI	146GB Serial-Attach SCSI
<b>2<sup>nd</sup> Hard Disk</b>	1.0TB Serial-Attach SCSI	300GB Serial-Attach SCSI	146GB Serial-Attach SCSI
<b>3<sup>rd</sup> Hard Disk</b>	1.0TB Serial-Attach SCSI	300GB Serial-Attach SCSI	146GB Serial-Attach SCSI
<b>4<sup>th</sup> Hard Disk</b>	1.0TB Serial-Attach SCSI	300GB Serial-Attach SCSI	
<b>5<sup>th</sup> Hard Disk</b>	1.0TB Serial-Attach SCSI		
<b>6<sup>th</sup> -12<sup>th</sup> Hard Disk</b>	1.0TB Serial-Attach SCSI		
<b>Tape Backup Drive</b>	Standard LTO-4 1.8 TB Backup Device	Standard LTO-4 1.8 TB Backup Device	Standard LTO-4 1.8 TB Backup Device
<b>Network Adapter</b>	On-Board Dual Gigabit Network Adapter	On-Board Dual Gigabit Network Adapter	On-Board Dual Gigabit Network Adapter
<b>CD-ROM</b>	DVD ±RW	DVD ±RW	DVD ±RW
<b>Keyboard/Monitor</b>	Standard PS2 or USB	Standard PS2 or USB	Standard PS2 or USB
<b>Monitor</b>	Standard 1024x768 LCD monitor	Standard 1024x768 LCD monitor	Standard 1024x768 LCD monitor
<b>Smart UPS</b>	A compatible UPS with Lab and a Surge Protector	A compatible UPS with Lab and a Surge Protector	A compatible UPS with Lab and a Surge Protector

**Table 2.1-1: Server Hardware Requirements**

<sup>1</sup> Note: Large labs are advised to contact the CODIS Help Desk for assistance before making the purchase to ensure proper configurations. CODIS Help Desk can also assist in finding faster and less expensive processor chips.

## 2.1.2 Client Hardware Requirements

CODIS 7.0 Hardware Requirements	
	Client
<b>Processor</b>	Core 2 Dual Intel® 3.0 GHz
<b>Memory</b>	4GB (DDR2 SDRAM)
<b>1<sup>st</sup> Hard Disk</b>	250GB SATA
<b>Network Adapter</b>	On-Board Dual Gigabit Network Adapter
<b>CD-ROM</b>	DVD ±RW
<b>Keyboard &amp; Mouse</b>	Standard PS2 or USB
<b>Monitor</b>	Standard 1024x768 LCD monitor

**Table 2.1-2: Client Hardware Requirements**

The HSRG provides the recommended hardware configuration for all levels (NDIS/LDIS/SDIS) of CODIS 7.0 labs based on technologies that are currently available. The CODIS 7.0 system requirements for each lab vary depending on the size of the lab and the number of specimens in the database. CODIS 7.0 labs are categorized according to the expected number of specimens they will have in three years, which is the usual lifetime for a system server. Medium-sized labs that expect to expand beyond the maximum specimen number in a 3-year period should consider purchasing the hardware recommended for large labs.

## 2.2 Hardware Cost Analysis

The *Next Generation CODIS Prototype Hardware Assessment Report* documented the results of the CODIS 7.0 NGISS AutoSearcher prototype (50 million specimens). This report indicated that the SUN X4600 eight (8) 2.8GHz AMD Opteron 8222 dual-core processors 2.8 GHz with 64 GB RAM provided the best performance and price for a large lab.

Table 2.2-1 provides a comparison of server costs. The costs are estimated as of June, 2009. Model numbers, options, and price vary depending on the final configuration. Price does not include tape backup hardware/software, Universal Power Supply (UPS), and surge protector.

Lab Size	Specifications	Manufactures and Models	Estimated Cost
<b>Small</b>	Dual Core Intel® Xeon® 3.33GHz, 4GB RAM, 3x146 GB hard drive	Dell PowerEdge 2950, HP Proliant ML370 G5,	\$8,000-\$ 9,000
<b>Medium</b>	Dual Core Intel® Xeon® 3.33GHz, 8GB RAM, 4x300GB hard drive	Dell PowerEdge 2950, HP Proliant ML370 G5,	\$12,000 -\$15,000
<b>Large</b>	(8) 2.8GHz AMD Opteron 8222 dual-core processors 2.8 GHz, 128GB RAM, 12x1.0TB hard drive	SUN X4600, Unisys ES7000, SUN X4450	\$35,000 -\$40,000
<b>Client</b>	Core 2 Dual Intel® 3.0 GHz, 4GB RAM, 250GB hard drive	Dell OptiPlex 760, HP DC5800,	\$1,016-\$1,250

**Table 2.2-1: Server Cost Analysis**



## 2.3 Hard Disk RAID 5

The CODIS 7.0 servers are required to have built-in redundancy on a hard disk level, while maintaining a high level of performance. It is recommended that RAID 5 technology be used to achieve this requirement. SCSI Attached Storage (SAS) or Serial Advance Technology Attachment (SATA) drives should be implemented in the CODIS 7.0 labs as a cost-effective and reliable solution. If RAID 5 is not an option for some smaller labs, then RAID 1 is an alternative choice. It provides very good overall performance and some redundancy, despite smaller storage capabilities.

## 2.4 Backup System

Each laboratory is required to backup its local CODIS database. Many commercial backup systems are available. Tape backup is a popular solution for disaster recovery and off-site backups. Other backup solutions include network storage and network backups. In general, dedicated LTO-4 tape backups and Symantec Backup Exec software is recommended. If your laboratory is using an alternative backup solution, and there are concerns about how CODIS can leverage your existing backup infrastructure, please contact the CODIS Help Desk.

## 2.5 Smart Universal Power Supply (UPS)

Laboratories that do not already have a UPS should consider obtaining this product. Protecting laboratory equipment with a UPS is essential. System Administrators should check with the laboratory facility engineer to verify that the current UPS is compatible with CODIS hardware prior to purchasing.

## 3.0 SERVER & CLIENT SOFTWARE REQUIREMENTS

This section provides recommendations for successful installation and deployment of CODIS 7.0 server and client software.

### 3.1 Supported Server Operating Systems and Database Servers

Table 3.1-1 lists the operating systems and database servers that CODIS 7.0 supports.

Microsoft Windows Server OS	SQL Server Version
Windows Server 2003 32 bit	SQL Server 2005 32 bit
Windows Server 2008 32 bit	SQL Server 2008 32 bit
Windows Server 2008 64 bit	SQL Server 2008 64 bit

**Table 3.1-1: Server Operating Systems and Database Servers**

In general, SQL Server 2008 should be installed on Windows Server 2008 and SQL Server 32 bit should be installed on Windows Server 32 bit. The recommended server software requirements are provided in Table 3.1-2.

<b>CODIS 7.0 Server Software Requirements</b>			
	<b>Server (large labs)</b>	<b>Server (medium labs)</b>	<b>Server (small labs)</b>
<b>Operating System</b>	Windows Server 2008 R2 64 Bit (Enterprise Edition)	Windows Server 2008 R2 64 Bit (Standard Edition) <sup>2</sup>	Windows Server 2008 R2 32 Bit (Standard Edition)
<b>Database</b>	Microsoft SQL Server 2008 - SP1 64 bit (Enterprise Edition)	Microsoft SQL Server 2008 - SP1 32 bit (Standard Edition)	Microsoft SQL Server 2008 SP1 32 Bit (Standard Edition )
<b>Anti Virus Software</b>	Symantec Endpoint Protection 11	Symantec Endpoint Protection 11	Symantec Endpoint Protection 11
<b>Tape Backup</b>	Symantec Backup Exec for Windows Servers 12	Symantec Backup Exec for Windows Servers 12	Symantec Backup Exec for Windows Servers 12
<b>Optional Productivity Software</b>	Microsoft Office Professional 2007	Microsoft Office Professional 2007	Microsoft Office Professional 2007
<b>Remote Access</b>	Symantec PcAnywhere 12.5	Symantec PcAnywhere 12.5	Symantec PcAnywhere 12.5

**Table 3.1-2: Server Software Requirements**

For backward compatibilities, the configurations in Table 3.1-3 are also supported.

<b>CODIS 7.0 Server Software Requirements</b>		
	<b>Server (medium labs)</b>	<b>Server (small labs)</b>
<b>Operating System</b>	Windows Server 2003 R2 32 Bit (Enterprise Edition)	Windows Server 2003 R2 32 Bit (Standard Edition)
<b>Database</b>	Microsoft SQL Server 2005 SP3 32 Bit (Standard Edition )	Microsoft SQL Server 2005 SP3 32 Bit (Standard Edition )
<b>Anti Virus Software</b>	Symantec Endpoint Protection 11	Symantec Endpoint Protection 11
<b>Tape Backup</b>	Symantec Backup Exec for Windows Servers 12	Symantec Backup Exec for Windows Servers 12
<b>Optional Productivity Software</b>	Microsoft Office Professional 2007	Microsoft Office Professional 2007
<b>Remote Access</b>	Symantec PcAnywhere 12.5	Symantec PcAnywhere 12.5

**Table 3.1-3: Server Software Requirements for Backward Compatibility**

Windows Server 2008 R2 64 Bit (Standard Edition) is recommended for CODIS 7.0 servers at labs expected to have 500,000 to 1 million specimens over the next three years. Windows Server 2008 R2 64 Bit (Enterprise Edition) is recommended for CODIS 7.0 servers at labs expected to have 1 million to 50 million specimens over the next three years.

## **3.2 Supported Client Operating Systems**

CODIS 7.0 supports the following client operating systems:

- Windows XP Professional 32bit SP3
- Windows Vista 32bit and 64bit SP2

Table 3.2-1 lists the software requirements both client operating systems.

<sup>2</sup> Windows Server 2008 STANDARD 64bit is recommended over Windows Server 2008 ENTERPRISE 32bit for cost saving purposes. The 64bit version supports larger memory requirements.

CODIS 7.0 Client Software Requirements		
	Windows XP	Windows Vista
<b>Operating System</b>	Windows XP Professional SP3	Windows Vista Professional SP2
<b>Database</b>	Microsoft SQL Server 2005 (From Server CD)	Microsoft SQL Server 2008 (From Server CD)
<b>Anti Virus Software</b>	Symantec Endpoint Protection 11	Symantec Endpoint Protection 11
<b>Productivity Software</b>	Microsoft Office Professional 2007	Microsoft Office Professional 2007
<b>Remote Access</b>	Symantec PcAnywhere 12.5	Symantec PcAnywhere 12.5

**Table 3.2-1: Client Software Requirements**

### 3.3 Software Cost Analysis

Table 3.3-1 provides a snapshot of estimated costs for the various operating and database systems, as well as productivity, anti-virus, remote access, and tape backup software.

Software	Software Detail	Estimated Cost
Windows OS	Windows 2008 R2 Enterprise	\$3,999 with 25 CALs
Windows OS	Windows 2008 R2 Standard	\$999 with 5 CALs
Windows OS	Windows 2003 R2 Standard	\$999 with 5 CALs
Windows OS	Windows Vista SP2 (Ultimate, Business) 32bit or 64bit	\$188
Windows OS	Windows XP SP3 Professional	\$128
SQL Server	MS SQL Server 2008 SP1 Enterprise	\$13,969 with 25 CALs
SQL Server	MS SQL Server 2008 SP1 Standard	\$1,849 with 5 CALs
SQL Server	MS SQL Server 2005 SP3 Standard	\$1,849 with 5 CALs
Productivity Software	MS Office 2007 Professional	\$184
Anti-virus	Symantec Endpoint Protection 11	\$120
Remote Access	Symantec PcAnywhere 12.5	\$90
Tape Backup	Symantec Backup Exec for Windows Servers 12.0	\$44

**Table 3.3-1: Software Costs**

The estimated costs are basically the same whether selecting the 32bit or 64bit version, the Windows 2003 or Windows 2008 version, or the SQL 2005 or SQL 2008 version.

### 3.4 Database

MS SQL Server 2008 (Standard Edition) is recommended for CODIS 7.0 labs; however, MS SQL Server 2005 is also supported.

### 3.5 Microsoft .Net Frameworks

The following .Net Frameworks are required for CODIS 7.0:

- Microsoft .NET Framework 2.0 Service Pack 2
- Microsoft .NET Framework 3.0 Service Pack 2

- Microsoft .NET Framework 3.5 SP1

### **3.6 Microsoft OS Security Hot fixes**

All of the most current OS security hot fixes are required.

### **3.7 Anti-Virus**

Labs should use Symantec Endpoint Protection 11. They may also use McAfee Virus Scan.

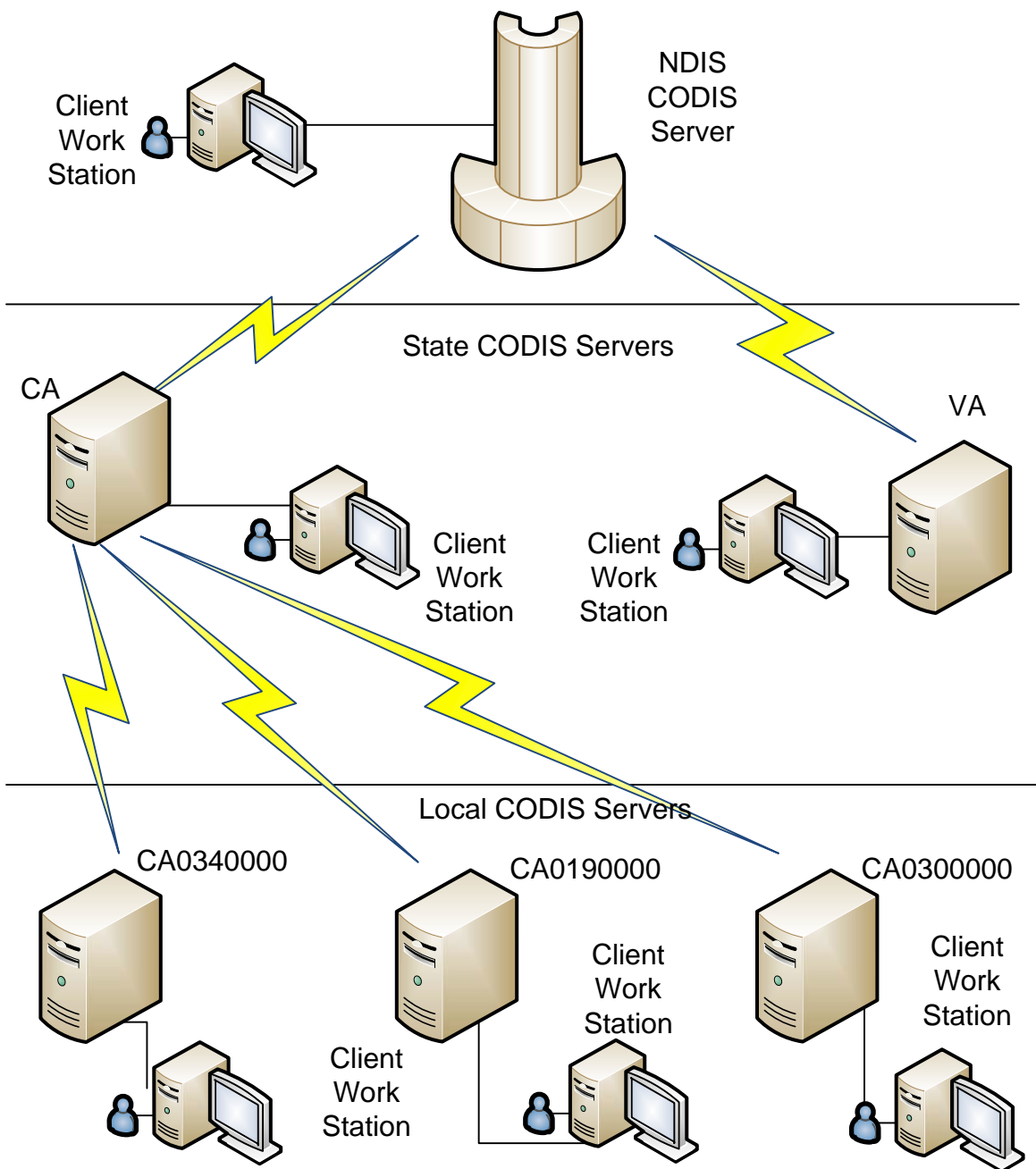
### **3.8 Tape Backup**

Labs should use Symantec Backup Exec for Windows Servers. They may also use Veritas backup software.

## **4.0 CODIS 7.0 COMMUNICATIONS**

The following diagram (Figure 4.0-1) describes the communication between state labs and the national lab. In general, local labs within a state only communicate with the state lab. The state labs communicate directly with the national lab, but not with each other. In the event that state labs need to share information with each other, they must upload data to the national lab. The national lab then performs the search and sends the results back to the state labs.

# CODIS 7.0 Communications



**Figure 4.0-1: Communications Structure**

## 5.0 SMALL LAB ONE PAGE SUMMARY

Since the majority of labs are categorized as either small or medium, Table 5.0-1 summarizes small lab hardware requirements. Table 5.0-2 summarizes small lab software requirements. Section 6.0 summarizes lab hardware requirements for medium sized labs.

Lab	# Specimens (within three years)
Small	Less than 2 million Specimens

CODIS 7.0 Hardware Requirements		
	Server (small labs)	Client (small labs)
<b>Processor</b>	Dual Core Intel® Xeon® 3.33GHz	Core 2 Dual Intel® 3.0 GHz
<b>Memory</b>	4GB	4GB
<b>Hard Disk RAID</b>	RAID 5 Integrated SAS 15K drives	
<b>1<sup>st</sup> Hard Disk</b>	146GB Serial-Attach SCSI	250GB SATA
<b>2<sup>nd</sup> Hard Disk</b>	146GB Serial-Attach SCSI	
<b>3<sup>rd</sup> Hard Disk</b>	146GB Serial-Attach SCSI	
<b>4<sup>th</sup> Hard Disk</b>		
<b>Tape Backup Drive</b>	Standard LTO-4 1.8 TB Backup Device	
<b>Network Adapter</b>	On-Board Dual Gigabit Network Adapter	On-Board Dual Gigabit Network Adapter
<b>CD-ROM</b>	DVD ±RW	DVD ±RW
<b>Keyboard &amp; Mouse</b>	Standard PS2 or USB	Standard PS2 or USB
<b>Monitor</b>	Standard 1024x768 LCD monitor	Standard 1024x768 LCD monitor
<b>Smart UPS</b>	A compatible UPS with Lab and a Surge Protector	

**Table 5.0-1: Small Lab Hardware Requirements**

CODIS 7.0 Software Requirements			
	Server (small labs)	Windows XP	Windows Vista
<b>Operating System</b>	Windows Server 2008 R2 32 Bit (Standard Edition)	Windows XP Professional SP3 32 Bit	Windows Vista Professional SP2 32 Bit or 64 Bit
<b>Database</b>	Microsoft SQL Server 2008 SP1 32 Bit (Standard Edition )	Microsoft SQL Server 2005 (From Server CD)	Microsoft SQL Server 2008 (From Server CD)
<b>Anti Virus Software</b>	Symantec Endpoint Protection 11	Symantec Endpoint Protection 11	Symantec Endpoint Protection 11
<b>Tape Backup</b>	Symantec Backup Exec for Windows Servers 12		
<b>Optional Productivity Software</b>	Microsoft Office Professional 2007	Microsoft Office Professional 2007	Microsoft Office Professional 2007
<b>Remote Access</b>	Symantec PcAnywhere 12.5	Symantec PcAnywhere 12.5	Symantec PcAnywhere 12.5

**Table 5.0-2: Small Lab Software Requirements**

## 6.0 MEDIUM LAB ONE PAGE SUMMARY

The majority of labs are categorized as either small or medium. Small lab hardware and software requirements were summarized in Section 5.0. Table 6.0-1 summarizes medium-sized lab hardware requirements. Table 6.0-2 summarizes medium-sized lab software requirements.

Lab	# Specimens (within three years)
Medium	between 2 million and 5 million specimens

CODIS 7.0 Hardware Requirements		
	Server (medium labs)	Client (medium labs)
Processor	Dual Core Intel® Xeon® 3.33GHz	Core 2 Dual Intel® 3.0 GHz
Memory	8GB	4GB
Hard Disk RAID	RAID 5 Integrated SAS 15K drives	
1 <sup>st</sup> Hard Disk	300GB Serial-Attach SCSI	250GB SATA
2 <sup>nd</sup> Hard Disk	300GB Serial-Attach SCSI	
3 <sup>rd</sup> Hard Disk	300GB Serial-Attach SCSI	
4 <sup>th</sup> Hard Disk	300GB Serial-Attach SCSI	
Tape Backup Drive	Standard LTO-4 1.8 TB Backup Device	
Network Adapter	On-Board Dual Gigabit Network Adapter	On-Board Dual Gigabit Network Adapter
CD-ROM	DVD ±RW	DVD ±RW
Keyboard & Mouse	Standard PS2 or USB	Standard PS2 or USB
Monitor	Standard 1024x768 LCD monitor	Standard 1024x768 LCD monitor
Smart UPS	A compatible UPS with Lab and a Surge Protector	

**Table 6.0-1: Medium-Sized Lab Hardware Requirements**

CODIS 7.0 Software Requirements			
	Server (medium labs)	Client Windows XP	Client Windows Vista
Operating System	Windows Server 2008 R2 64 Bit (Standard Edition)	Windows XP Professional SP3 32 Bit	Windows Vista Professional SP2 32 Bit or 64 Bit
Database	Microsoft SQL Server 2008 - SP1 64 Bit (Standard Edition)	Microsoft SQL Server 2005 (From Server CD)	Microsoft SQL Server 2008 (From Server CD)
Anti Virus Software	Symantec Endpoint Protection 11	Symantec Endpoint Protection 11	Symantec Endpoint Protection 11
Tape Backup	Symantec Backup Exec for Windows Servers 12		
Optional Productivity Software	Microsoft Office Professional 2007	Microsoft Office Professional 2007	Microsoft Office Professional 2007
Remote Access	Symantec PcAnywhere 12.5	Symantec PcAnywhere 12.5	Symantec PcAnywhere 12.5

**Table 6.0-2: Medium-Sized Lab Software Requirements**

## 7.0 LARGE LAB ONE PAGE SUMMARY

A large CODIS 7.0 lab is categorized by the extremely large number of specimens processed there. Table 7.0-1 provides the hardware requirements for such a lab, and Table 7.0-2 provides its software requirements.

Lab	# Specimens (within three years)
Large	between 5 million and 50 million specimens

CODIS 7.0 Hardware Requirements		
	Server (large labs) <sup>3</sup>	Client (large lab)
Processor	8 2.8GHz AMD Opteron Dual-core processors 2.8 GHz	Core 2 Dual Intel® 3.0 GHz
Memory	128GB	4GB
Hard Disk RAID	RAID 5 Integrated SAS 15K drives	
1 <sup>st</sup> Hard Disk	1.0TB Serial-Attach SCSI	250GB SATA
2 <sup>nd</sup> Hard Disk	1.0TB Serial-Attach SCSI	
3 <sup>rd</sup> Hard Disk	1.0TB Serial-Attach SCSI	
4 <sup>th</sup> Hard Disk	1.0TB Serial-Attach SCSI	
5 <sup>th</sup> Hard Disk	1.0TB Serial-Attach SCSI	
6 <sup>th</sup> –12 <sup>th</sup> Hard Disk	1.0TB Serial-Attach SCSI	
Tape Backup Drive	Standard LTO-4 1.8 TB Backup Device	
Network Adapter	On-Board Dual Gigabit Network Adapter	On-Board Dual Gigabit Network Adapter
CD-ROM	DVD ±RW	DVD ±RW
Keyboard & Mouse	Standard PS2 or USB	Standard PS2 or USB
Monitor	Standard 1024x768 LCD monitor	Standard 1024x768 LCD monitor
Smart UPS	A compatible UPS with Lab and a Surge Protector	

**Table 7.0-1: Large Lab Hardware Requirements**

CODIS 7.0 Software Requirements			
	Server (large labs)	Client Windows XP	Client Windows Vista
Operating System	Windows Server 2008 R2 64 Bit (Enterprise Edition)	Windows XP Professional SP3 32 Bit	Windows Vista Professional SP2 32 Bit or 64 Bit
Database	Microsoft SQL Server 2008 - SP1 32 bit (Enterprise Edition)	Microsoft SQL Server 2005 (From Server CD)	Microsoft SQL Server 2008 (From Server CD)
Anti Virus Software	Symantec Endpoint Protection 11	Symantec Endpoint Protection 11	Symantec Endpoint Protection 11
Tape Backup	Symantec Backup Exec for Windows Servers 12		
Optional Productivity Software	Microsoft Office Professional 2007	Microsoft Office Professional 2007	Microsoft Office Professional 2007
Remote Access	Symantec PcAnywhere 12.5	Symantec PcAnywhere 12.5	Symantec PcAnywhere 12.5

**Table 7.0-2: Large Lab Software Requirements**

<sup>3</sup> Note: Large labs are advised to contact the CODIS Help Desk for assistance before making a purchase to ensure proper configuration. CODIS Help Desk can also assist in finding faster and less expensive processor chips, such as the soon to be released (but not yet tested) Intel Quad Core Xeon MP Tigerton chip.



## 8.0 CONTACTS FOR CODIS HARDWARE AND SOFTWARE INSTALLATION

The primary contact for all activities related to a CODIS 7.0 Hardware and Software Installation is the CODIS help desk. Contact information is as follows:

Government Transformation Center (GTC)  
11493 Sunset Hills Road  
Reston, VA 20190  
Phone: 1-877-CODISHD (263.4743) Option #2  
Fax: 703-439-3582  
Email: Codis.Helpdesk@unisys.com

## 9.0 REFERENCED DOCUMENTS

The following documents were referenced in the development of this document (their directory locations in Microsoft Visual SourceSafe are provided for ease of access):

1. *Next Generation CODIS Prototype Hardware Assessment Report (HAR)*: VSS/CODISdocs\CODIS 7.0P\Prototype Technical Documents\Hardware Assessment Report\CODIS7P\_HWAssessmentReport.doc, June, 2008.
2. *CODIS 7.0 Prototype Performance Assessment Report (PAR)*: VSS/CODISdocs\CODIS 7.0P\Testing and Technical Reviews\Performance Assessment Report\CODIS 70 Prototype Assessment Report.doc, September, 2008.