# IBM iDoctor for IBM i
# Overview and Installation

IBM iDoctor for IBM i Development Team

21 August 2023

## Abstract

Provides in-depth coverage of all major GUI functions for all components at 7.2 and higher.    This covers the overview and installation sections.

## Changes

21 August 2023 – Updated section for QMGTOOLs install information

8 August 2023 – Updated for 2023.

6 June 2023 – Corrected download link to ACS app pkg.

28 Jan 2022 – Created new document to separate the documentation into different documents for ease of maintenance.   This is sections 1, 2 and 3 found in the previous version of the documentation.

# Table of Contents

# 1   Introduction

## 1.1 Product Overview

IBM iDoctor for IBM i (iDoctor) is a suite of performance tools used by IBM and customers to collect and analyze performance data in order to quickly solve performance problems on IBM i.   The tools may be used to monitor overall system health at a high level or for analyzing performance details within job(s), disk unit(s) and/or programs collected.  iDoctor includes many drill-down options to assist you with the most logical next step listed first.

At 7.5 IBM iDoctor for IBM i includes the following components:

    Job Watcher
    Collection Services Investigator
    Disk Watcher
    Plan Cache Analyzer
    PEX Analyzer
    IBM i Explorer
    Power Connections
    QMGTOOLS (green screen only)

**Note:** Collection Services Investigator, Plan Cache Analyzer and Disk Watcher are included with a Job Watcher license.  The iDoctor license for Job Watcher is a different offering than the Job Watcher feature included with the Performance Tools LPP (licensed program product, PT1).  PT1 is not required to run iDoctor.

All components require IBM i 7.1 or higher with the required PTFs for each installed.  The required PTFs are listed on the iDoctor website for each release.  **Note:** Server build updates are no longer occurring at 7.2 and older.

## 1.2 Updates Summary

This PDF identifies the major changes with each release and can be found here:
https://public.dhe.ibm.com/services/us/igsc/idoctor/iDoctorUpdatesSummary.pdf

## 1.3 FAQs

The iDoctor Frequently Asked Questions document is available here:
https://public.dhe.ibm.com/services/us/igsc/idoctor/html/iDoctorFAQs.pdf

## 1.4 Videos

A few helpful videos on iDoctor usage can be found on the IBM Systems MediaCenter channel.

**IBM Systems MediaCenter:**
https://mediacenter.ibm.com/category/IBM+i/172218552

**iDoctor videos:**
https://mediacenter.ibm.com/channel/iDoctor/200077473

This is a place where you can find usage tip videos on the iDoctor tools suite as well as other topics related to IBM I support.
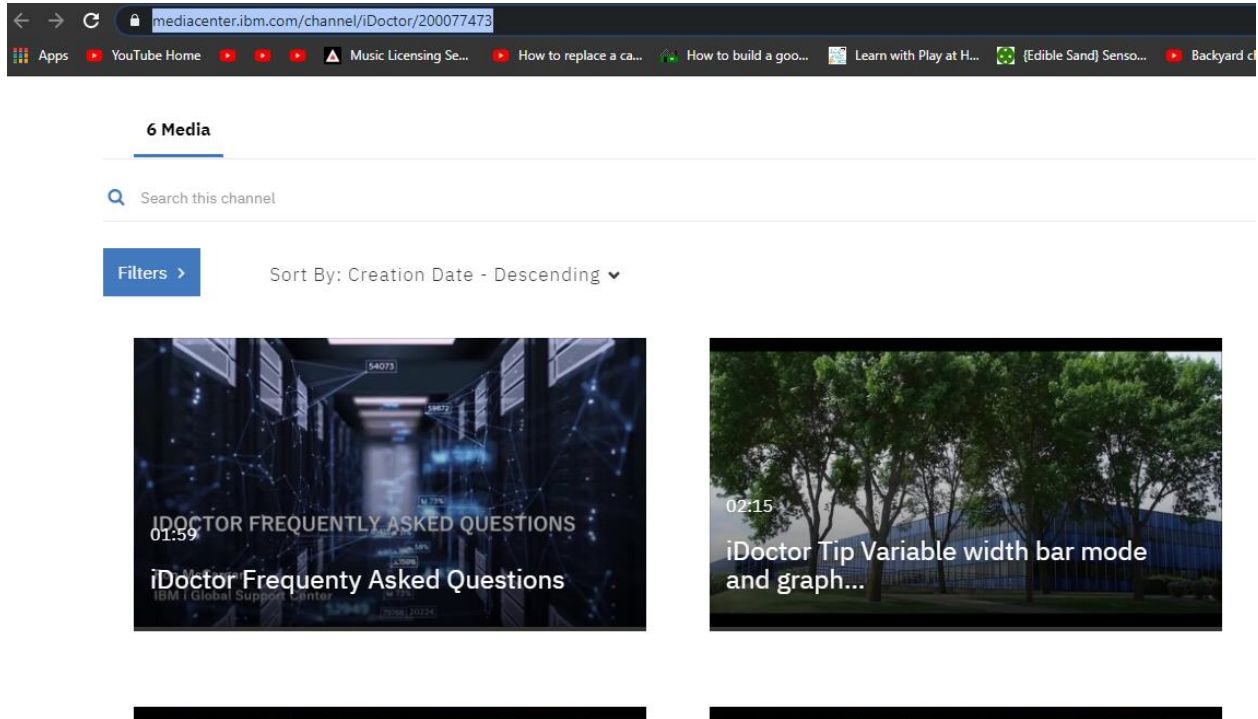
## 1.5 iDoctor Base Support/QIDRGUI Library

iDoctor has server and client components. QIDRGUI library contains functions/programs/commands needed for the GUI to function properly. Library QIDRGUI must be installed to use any of the iDoctor components with the GUI. In some cases, the library is also necessary when running iDoctor commands in other libraries (like QIDRPA/STRPACOL) because it contains several common objects.

This library also contains all the iDoctor stored procedures which are needed to perform many tasks needed by the GUI. When the GUI starts up it will often check the stored procedures in this library and see if they need to be updated and will attempt to update them via the GUI using create procedure SQL statements. This allows the user in many cases to use the latest client without updating the iDoctor server builds. This process does require that the user has authority to replace these *PGMs in QIDRGUI using SQL. The alternative to this is to install the latest server builds which also will apply the latest stored procedures.

## 1.6 IBM iDoctor for IBM i Job Watcher

Job Watcher returns real-time information about all jobs, threads and/or LIC tasks running on a system (or on a selected set of jobs/threads or tasks). The data is collected by a server job, stored in database files, and displayed on a client via the iDoctor GUI. Job Watcher is similar in sampling function to the system commands WRKACTJOB and WRKSYSACT in that each "refresh" computes delta information for the ending snapshot interval. Refreshes can be set to occur automatically, as frequently as every 100 milliseconds. The data harvested from the jobs/threads/tasks being watched is done so in a non-intrusive manner (like WRKSYSACT).

This data is summarized to show high-level overviews of system performance over time. From these overview charts a user can select a time period of interest and drill down. The drill down graphs from the overview charts into rankings graphs to show the job/thread experiencing the highest amount of work for the desired statistic. From the rankings graphs, users can select one or more job/threads to show how they performed over time.

The biggest advantage to Job Watcher for performance analysis over other tools is its extensive use of wait buckets.  These buckets consist of waits that are generally considered good or bad, and seeing the bad ones on a graph like seize contention makes it easy to identify problem areas for further investigation.

**The information harvested by Job Watcher includes:**

- Standard WRKSYSACT type info: CPU, DASD I/O breakdown, DASD space consumption, etc.
- Some data previously only seen in Collection Services: "real" user name, seize time, breakdown of what types of waits (all waits) that occurred.
- Some data not available anywhere else in real time: details on the current wait (duration, wait object, conflicting job info, specific LIC block point id), 1000 level deep invocation stack including LIC stack frames.
- SQL statements, host variables, communications data, activation group statistics
- Classic JVM statistics (6.1 and earlier releases only)
- J9 JVM statistics

Job Watcher is available for trial evaluation or purchase via this website.  A license for Job Watcher includes:
- Job Watcher software (licensed by system serial number via an access code)
- Collection Services Investigator software
- Disk Watcher software
- Electronic defect support for the software for the term of the contract
- No charge updates to the software for the term of the contract

The IBM Redbook for Job Watcher provides many examples for the use of Job Watcher.  This Redbook is available through the following link:  http://www.redbooks.ibm.com/abstracts/sg246474.html

**Note:**  This Redbook was written in the V5R3 timeframe (March 2005).

# 1.6.1      iDoctor Job Watcher vs PT1 (PDI) Job Watcher

At 6.1 and higher the PT1 LPP offers a Job Watcher GUI in the System Director Navigator web interface called Performance Data Investigator.

For the most part besides the obvious presentation differences all the functionality provided in the web interface is included with iDoctor.  For simplicity, here is a list of key functions provided in iDoctor Job Watcher **not** included with the web version:

- Time range graphs (ability to adjust the Time interval size used for graphing)
- Monitors (24 x 7 collection of data)
- Collection scheduling
- PTF checking
- Collection Summary analysis and improved graphing functions as a result
- Create Job Summary analysis to add up totals for the desired jobs across collection(s)
- Call Stack Summary analysis
- Long Transactions analysis
- Situational Analysis
- Dynamic legend (drag/drop, add/remove fields)
- Much faster tables/graphs and better flexibility.
- alternate views (quick toggles to other graph types)
- Collection search
- Call stack reports
- Report Generator – loads graphs and captures screenshots in batch
- Send data to IBM support
- Feature rich SQL editor
- Synchronized tables beneath the graphs

- SQL tables comparison wizard

Additional differences are described here (Note: As of 2015):
http://public.dhe.ibm.com/services/us/igsc/idoctor/JWComparison.jpg

# 1.7 Collection Services Investigator

Collection Services Investigator provides the user with the ability to analyze the performance database files produced by Collection Services. Collection Services is like Job Watcher in the statistics collected, but the primary difference is the interval size in Collection Services is usually much longer (5-15 minutes vs 5-15 seconds in Job Watcher). Collection Services Investigator can be used to analyze wait statistics, CPU, and I/O activity. Some types of communications reports are also provided.

Collection Services Investigator also includes a function that analyses multiple collections at once for the desired jobs for the purpose of comparing total I/Os, CPU, waits, etc for the collections being analyzed. This is useful when comparing the performance impact of batch runs from one day to the next.

CSI includes support to analyze external storage DS6K/DS8K device cache statistics as well as link and rank statistics for these devices.

# 1.8 Disk Watcher

Disk Watcher provides the user with the ability to collect either a statistical summary of disk performance data or a trace of all disk I/O events that occur on a system. The trace mode is recommended as it provides more options for analyzing the data and determining potential disk problems.

The Disk Watcher GUI provides many graphs with drill downs for each mode of collection (statistical or trace). Using Disk Watcher the user can take a trace and summarize the trace data into an interval size desired for the purpose of easily graphing the statistics at either or broad or detailed level.

# 1.9 Plan Cache Analyzer

Plan Cache Analyzer provides the ability to collect and analyze snapshots of the system's SQL Plan Cache. It is designed to complement the features already available in IBM i Navigator for analyzing the Plan Cache by providing several graphs and drill-down options not available there.

The plan cache is a repository that contains the access plans for queries that were optimized by SQE.

# 1.10 PEX Analyzer

The PEX Analyzer component is specifically geared towards pinpointing issues affecting system and application performance. This is the most advanced of the iDoctor components offering the most detailed reporting for disk operations, CPU utilization, file opens, MI programs, wait states, DASD space consumption and much more.

# 1.11 IBM i Explorer

This component is a general-purpose tool for viewing libraries and objects on the IBM i. Files can be transferred to/from a system using this tool.

When connected to an IBM i system it allows the user to work with either the IFS or the libraries on the system. If working with libraries and objects, many additional options are available to show object properties or view data within tables or construct SQL queries over the data they contain.

This is a free component offered "as-is".

# 1.12 Power Connections

Power Connections allows users to connect to VIOS or HMC systems from the iDoctor GUI interface. The connections in iDoctor have been segregated into two sections (IBM i and non IBM i.) The Power Connections View in the GUI represents the non-IBM i connections that have been defined within iDoctor.

Power Connections can be used to analyze nmon statistics or browse the file systems on VIOS or HMC. When analyzing nmon the data must be transferred to an IBM I for analysis using SQL DB2 databases and graphs.

The Power Connections support also includes scripts and functions to automatically analyze and transfer data to a central repository (currently IBM i only) for analysis.

Power Connections is a free tool offered "as-is".

# 1.13 QMGTOOLS (Must Gather Tools)

Must Gather Tools (QMGTOOLS library) is a set of tools to assist individual IBM support teams collect data for issues concerning their products. For example, the HA menu contains a set of programs that will collect specific items (job logs, SST macro output, VLOGs, and so on) to assist the technical representative in debugging a problem related to High-Availability. A user will install this tool and use the menu shown below to collect data for the specific problem:

```
MG                      Must Gather Data Collector
                  (C) COPYRIGHT IBM CORP. 2009, 2012
    Select one of the following:

         1. System Snapshot              14. External Storage
         2. HA (High Availability)       15. Work Management
         3. Performance/Misc collection  16. Internals
         4. Client/Server                17. Electronic Services
         5. Communications menu          18.
         6. Database menu                19. Hardware data collection
         7. CTA/EWS (JAVA/HTTP/DCM/WAS)  20. HMC menu
         8. Save/Restore menu
         9. Misc tools                   22. QSPTLIB menu
        10. FTP data to IBM              23. FTP spoolfile to IBM
        11. View FTP to IBM statuses     24. PTF menu
        12. Display build date           25. Store FTP2IBMCMD credentials
        13. Check IBM for updated QMGTOOLS  26. QMGTOOLS Help

    Selection or command
    ===> _


    F3=Exit   F4=Prompt   F9=Retrieve   F12=Cancel
    F13=Information Assistant  F16=System main menu


    MA  +  H                                            20/007
```

*Must Gather Tools main menu*

# 2  Installation

This chapter includes information about the following:

- IBM i installation requirements
- PC installation requirements
- Ports needed for GUI use
- Installing and uninstalling IBM iDoctor for IBM i

**Note:** For PTF requirements visit the iDoctor website
http://public.dhe.ibm.com/services/us/igsc/idoctor/html/ptfs.html

## 2.1  IBM i Requirements

- IBM i 7.1 or higher
- The required PTFs listed at http://public.dhe.ibm.com/services/us/igsc/idoctor/html/ptfs.html for the applicable download page must be loaded and applied.
- The user profile performing the installation must have *SECOFR user class and special authorities *ALLOBJ and *SECADM.
- The following host servers (identified by the SERVER parameter values on the STRHOSTSVR command) need to be running on the server:  *DATABASE, *RMTCMD, *SIGNON, *SRVMAP
- System value QALWOBJRST must be *ALL or (*ALWSYSSTT and *ALWPGMADP)
- **Note:** If English is not installed as the primary language, the user profiles used to connect to the server with should set their CCSID parameter value to 37 for best results.
- Power Connections requires OpenSSH option 1 (5733SC1) for the disk mapping function.
- Please ensure that if user profile QIDOCTOR is used, its CCSID is not set to 65535.

## 2.2  GUI Requirements

The following are required to run the iDoctor GUI:

A) **Windows** (Note: some users run iDoctor via Citrix/Linux KVM, Mac OS with Parallels or Remote Desktop)

The GUI is supported on Windows 10 (or higher). It also runs on Windows 7 and Windows Server but is not regularly tested on those Windows operating systems and therefore not officially supported.

**Note:** The user profile doing the installation must have administrator-level authority. Administrative level authority is not required to use iDoctor however once it is installed.

B) **If you wish to connect to IBM i systems, then the following must be installed:**

IBM i Access Client Solutions (ACS) base package and **ACS Windows Application Package** must **BOTH** be installed.  On the ACS download page be sure to download and install both and get the ACS Windows App Pkg English (64bit.).

| | | | |
|---|---|---|---|
| ACS Windows App Pkg English (64bit) | IBMiAccess_v1r1_Windows AP_English.zip | 53795601 B | Download ↓ |

For installation instructions see this video.

C) **Microsoft Visual C++ 2012 Redistributable Package (install both the x86 and x64 options)**

D) **Microsoft .NET 4.5 (required if using Power Connections and/or FTP methods other than the default - WININET)**

E) **Java 1.5 or higher (required for Power Connections functions only)**

**Note:** Some virus scanners or even Windows itself may prevent the opening of our downloads. In some cases, you may get errors and need to temporarily disable these to open the download image.

## 2.2.1      Ports needed for GUI access

See this support document for more information on which ports are needed for iDoctor use on a PC: https://www.ibm.com/support/pages/tcpip-ports-required-ibm-i-access-and-related-functions

# 2.3 Installation

**Note:** You can install the tools before installing the PTFs if desired. However, it is recommended to install the PTFs before collecting performance data. Use the Fix Central website if you need help installing PTFs.

After installation, you will have the following new libraries on your server depending on the components installed:

QIDRGUI - GUI (Base) support
QIDRWCH - Job Watcher
QIDRPA - PEX Analyzer
QMGTOOLS – Must Gather Tools   (**Note: This is a green screen only component.  It is also no longer installed by default or shipped with our builds.**  To install it anyway, then click here for more information on current steps required.

Also, you will find that directory /QIBM/ProdData/iDoctor will exist in the IFS after installation.

## 2.3.1      Install options

On the https://public.dhe.ibm.com/services/us/igsc/idoctor/html/downloadOptions.html page you will find several download options for installing iDoctor:

**Install options available:**

1. **"Automatic client update"** – This option can be used if you only want to install the GUI and do not need to install the server-side piece of iDoctor. **Note:** Keep in mind that installing client updates may not always work if your server builds are very old. Also, the iDoctor GUI will attempt to load newer versions of programs on your server at startup into library QIDRGUI. Do not install client updates if you have restrictions in place on production systems that do not allow program objects to be replaced. **Tip:** This method is also used after installing the GUI and starting it up. iDoctor will connect to our website and will ask you if you wish to update your client if a new build is available. You can enable/disable this check under Preferences -> Confirm

2. **"Installer for Windows and IBM I"** – This option is used if you have sufficient network access to download save files (SAVFs) from our FTP site; ftp://public.dhe.ibm.com/services/us/igsc/idoctor/web    The installation will download the required SAVFs automatically during installation and then send them to your IBM i for you**.**

3.  **"Installer for Windows and IBM i with the 7.2+ SAVFs"** – This option can be used if you are unable to download the SAVFs with the install program or need to do the installation manually. **This is often the best choice to use.**

The next section will present an example of installing iDoctor using option 2 above.

## 2.3.2 Installer for Windows and IBM i installation example

This section will show an example of using the "Installer for Windows and IBM i with the SAVFs" download option.  This is the recommended install method for new users.

Also see the following video to walk through installing iDoctor using this technique.
**https://mediacenter.ibm.com/media/Installing+iDoctor+on+an+IBM+i/1_t18tia7i/200077473**

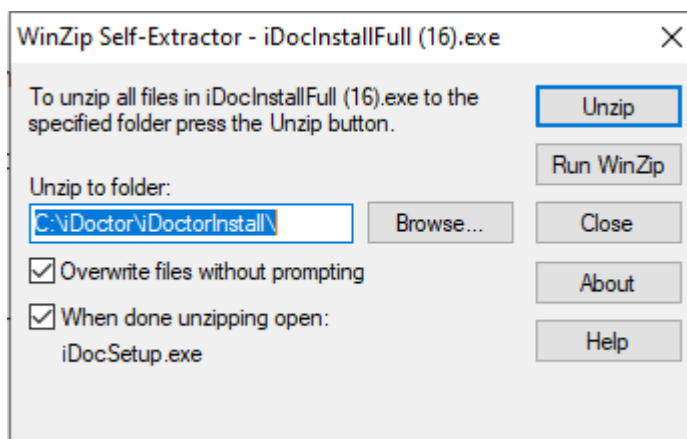**Step 1:**  Click the link below from our website to download the latest install image:
http://public.dhe.ibm.com/services/us/igsc/idoctor/html/downloadOptions.html

| Description | Build | Size | Date |
|---|---|---|---|
| ↓ Automatic Client Update | C01615 | 21.8 MB | 26 May 2023 |
| ↓ Installer for Windows and IBM i | C01615 | 21.8 MB | 26 May 2023 |
| ↓ Installer for Windows and IBM i with the 7.2+ SAVFs | C01615 | 401 MB | 26 May 2023 |

**Step 2:**  Depending on the web browser installed there will be different prompts/warnings before being able to open the installer.   You could also save the file to your PC and open it there instead.

**Note:**  Some virus scanners or even Windows itself may prevent the opening of our downloads.  In some cases you may get errors and have to temporarily disable these in order to open the image.

**Step 3:** After opening the download .exe, choose the desired temporary folder for the install files to be extracted to and press Unzip.

WinZip Self-Extractor - iDocInstallFull (16).exe     ✕

To unzip all files in iDocInstallFull (16).exe to the specified folder press the Unzip button.

Unzip to folder:
C:\iDoctor\iDoctorInstall\          Browse...

☑ Overwrite files without prompting
☑ When done unzipping open:
   iDocSetup.exe

[Unzip] [Run WinZip] [Close] [About] [Help]

**Step 4**: This screen identifies the version of iDoctor installed on the PC (if found) and indicates where the server image save files will be installed from.
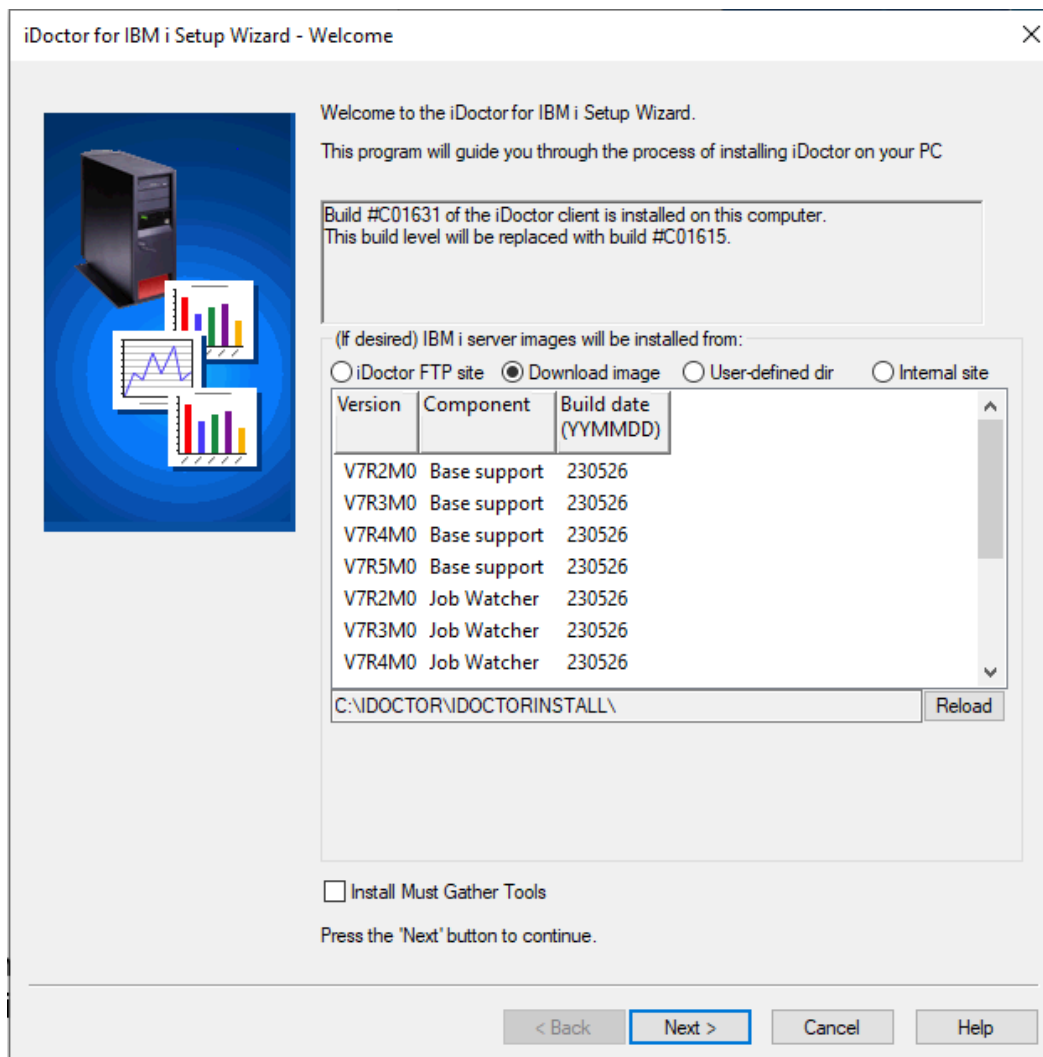
The following options are shown:

- iDoctor FTP site: Most users should use this to download the SAVFs from our website.
- Download image:  Use this option if you picked the install image where the SAVFs are bundled.
- User-defined dir:  Advanced users can use this option if you need to install using SAVFs in a directory on your PC (or network drive.)
- Internal site: For IBMers only.

Click the Download image option and click 'Next'.

**Step 5:**  On the next screen, click the 'Accept All' button then the 'Next' button to indicate acceptance of the license agreements.  Use the View button next to each component name to view the desired license agreement.

These agreements apply to both the iDoctor client and server code installed.  Even if you are only using a trial version, the agreements apply to all users.

**Step 6:**  Select the type of installation to perform.  This screen allows you to choose whether to install the server side of iDoctor, the client side of iDoctor or both.
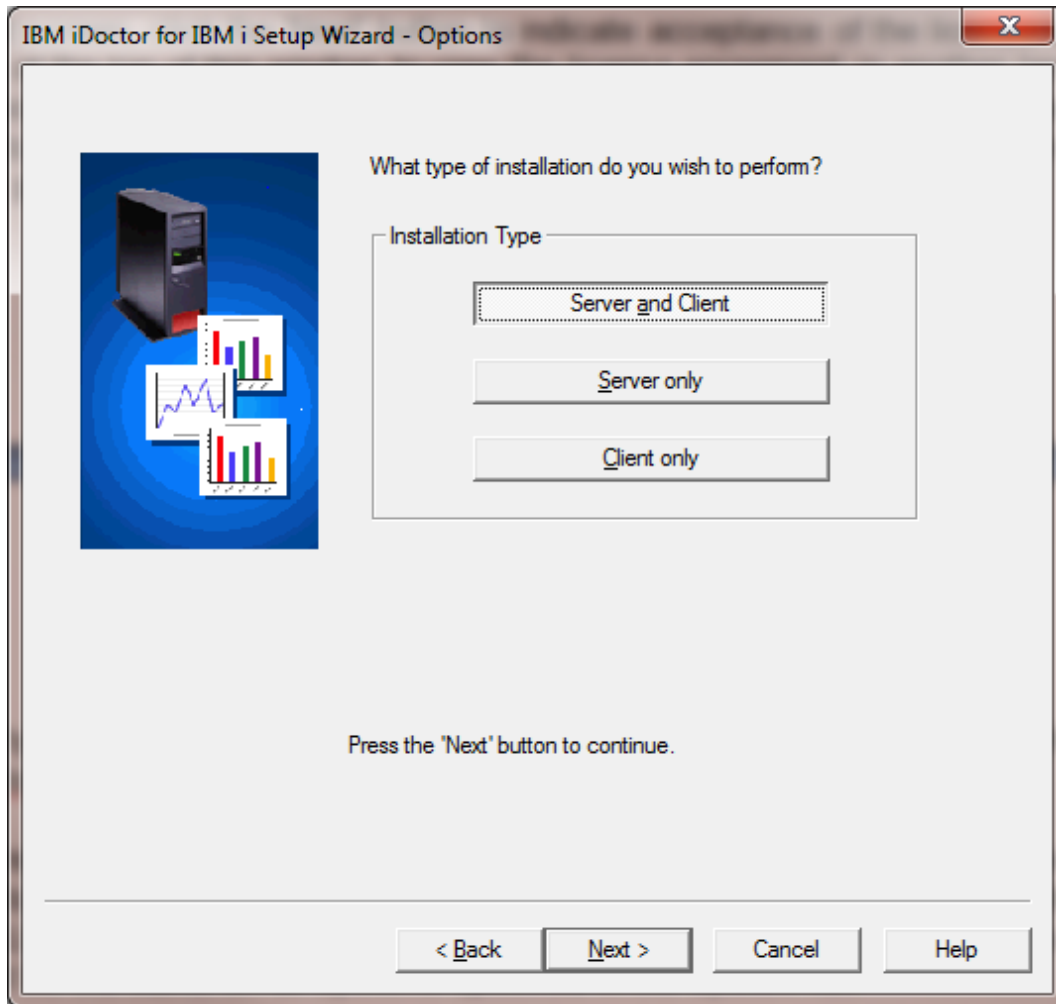
**Step 7:** If you are installing the server side of iDoctor you will see a screen asking for the connection information to use to access the server(s). The user profile must have the user class authority of *SECOFR and *ALLOBJ, *SECADM special authorities. If installing on multiple systems, the user profile and password must be the same on all systems specified in the system list.

If desired, you may use the Save and Load buttons to save a system list to a text file or load one into this interface that was previously saved. This file is a simple list of system names or IP addresses with each entry on a separate line.

When clicking 'Next', system validation will occur, which means that each system will be checked to make sure they are ready for iDoctor to be installed.  If any errors occur a screen will be shown that allows you to view the problems and take corrective action.

**Step 8:**  The next page gives you the option to specify which type of connection should be used when sending the SAVFs to the IBM i.  This piece requires the system to be setup properly to allow FTP connections, or you could try using one of the SSH options which would require additional setup as well to use those connections correctly (outside of the scope of this document.)
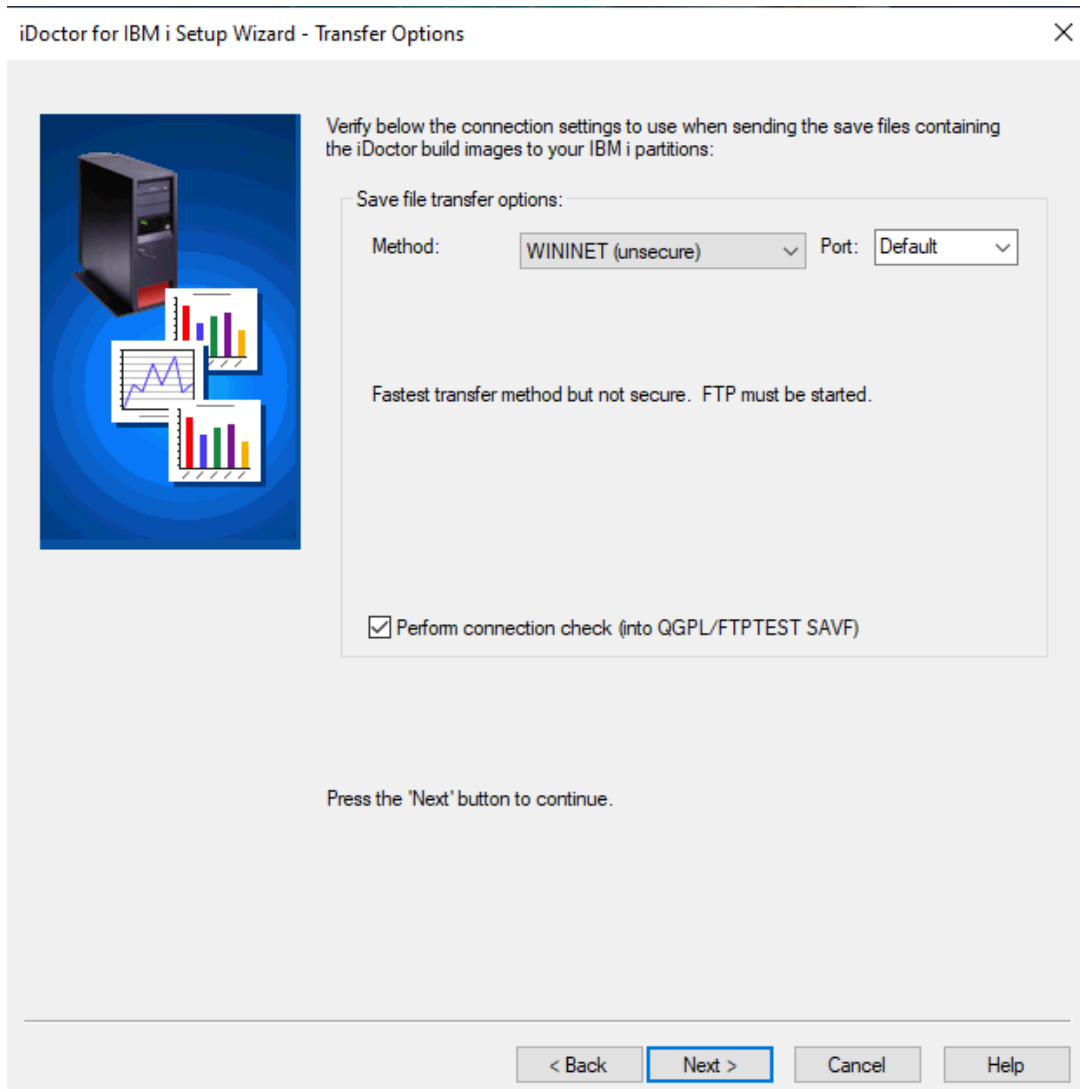
Clicking 'Next' on this screen will verify that the connection is working between the PC and the server specified (or the 1st server specified if installing on multiple systems). Uncheck the option "Perform connection check" to skip verification.

**Step 9:** This screen allows you to specify the directory the iDoctor client should be installed to.

Installing multiple instances of the iDoctor client into different directories is now supported and recommended. Therefore, the default location for the GUI is now C:\iDoctor\Cnnnnn where nnnnn is the build number. Uncheck the create shortcuts using this directory on the Start menu option on this screen if desired. You will need to make multiple shortcuts manually if you are using multiple versions of the iDoctor GUI.

iDoctor for IBM i Setup Wizard - Client Install Directory                    ✕

The directory below is the location the iDoctor client will be installed to.
Note: By specifying a different directory, multiple versions can reside on
the same PC.

IBM iDoctor for IBM i client install directory

| C:\iDoctor\C01615 | ⌄ | Browse |

☑ Create shortcuts using this directory on the Start Menu.

Press the 'Next' button to continue.

| < Back | Next > | Cancel | Help |

**Step 10** A summary of your selections appears on the final screen.

iDoctor for IBM i Setup Wizard - Summary      ✕

The following options will be installed:

Components to install:

| Version | Component | Build date (YYMMDD) |
|---------|-----------|---------------------|
| V7R2M0 | Base support | 230526 |
| V7R3M0 | Base support | 230526 |
| V7R4M0 | Base support | 230526 |
| V7R5M0 | Base support | 230526 |
| V7R2M0 | Job Watcher | 230526 |

Systems to install on:           Max install threads to use:   10

| System name |
|-------------|
| IDOC730 |

☐ Ignore errors on RSTLIB

Build #C01631 of the iDoctor client is installed on this computer.
This build level will be replaced with build #C01615.

Setup logfile directory:

C:\iDoctor\C01615\setuplogs

Press the 'Finish' button to begin installation.

     < Back     Finish     Cancel     Help

**Step 11** Clicking the 'Finish' button will copy all of the files and run the commands necessary to install the server and/or client portion for the selected components.  The server portion of the installation will take a few minutes.

After the install completes the setup log file (for each component installed) will be viewable if needed through the install program.  To do this, first select the desired system and component from the progress window to view the setup log for, and then click the Display setup log button.

If any errors occur that you are unable to resolve on your own, send the log file to idoctor@us.ibm.com for assistance.  The log file directory is listed at the bottom of the last panel of the Wizard and can be modified.

**Note:**  In some cases, certain component installations may fail.  This can occur because of rare timing issues with our multithreaded install process.  Typically selecting the failed component and using the **"Reinstall selected"** will succeed in installing the component on the 2nd attempt.  Should problems persist, contact us for help.  If you wish to avoid this issue, you can set the "Max install threads to use" value to 1 although the install will take much longer especially on multiple LPARs.

## 2.3.3    QMGTOOLS

QMGTOOLs is no longer installed or shipped with iDoctor builds by default.

<mark>**Note:** QMGTOOLS will sometimes fail to install because it's in the library list and dozens of jobs have the library locked.  So typically, something will be locked, and it will fail to install completely.  That's the main reason we no longer update QMGTOOLS in iDoctor by default and it's probably best done right after an IPL.  Use the CLRLIB option in the installation is highly recommended but even with that it still may fail.</mark>

### 2.3.3.1    Using the support document information (recommended):

See this page:  https://www.ibm.com/support/pages/qmgtools-how-check-and-update-qmgtools

### 2.3.3.2    Using the GUI installer with FTP access

Using any client update such as
https://public.dhe.ibm.com/services/us/igsc/idoctor/iDoctorClientC01615.exe

1. Download the image from here:
   https://public.dhe.ibm.com/services/us/igsc/idoctor/html/downloadOptions.html
2. Check the box to **Install Must Gather Tools** found on the welcome screen.
3. Check the **iDoctor FTP site** option on the welcome screen.
4. Click next and proceed with installation normally.
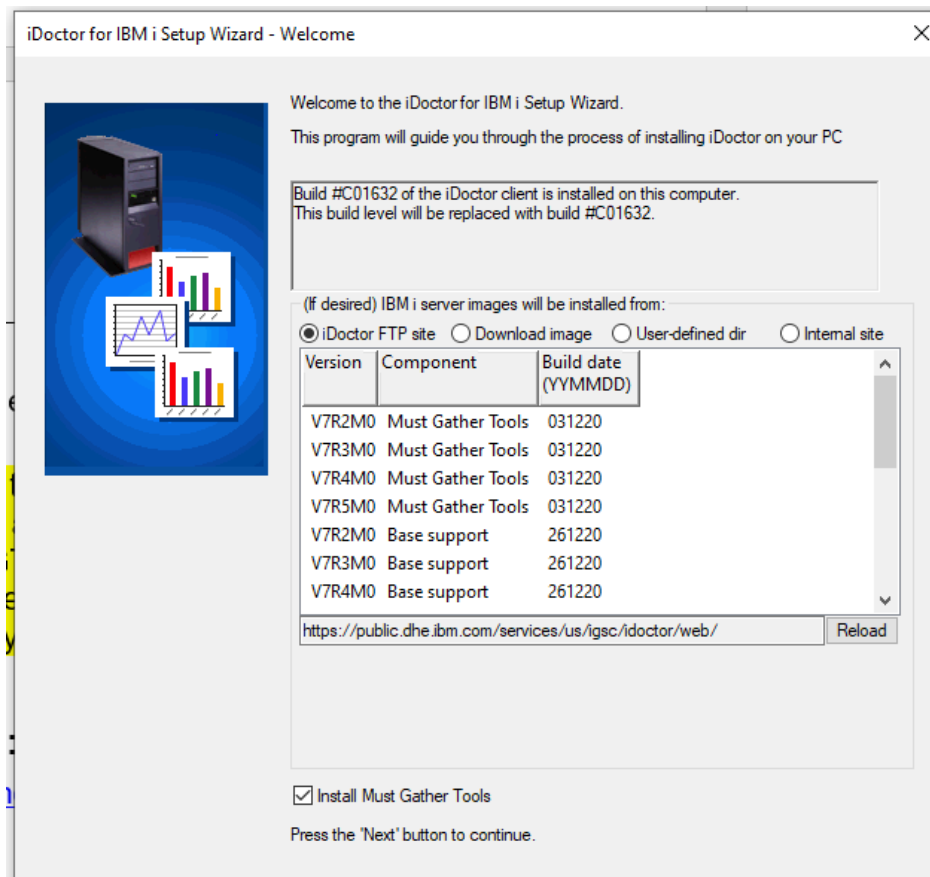
### 2.3.3.3 Using manually downloaded save files

To install it using our GUI installer and manually downloaded qmgtool*.savf save files it requires these steps:

1. Download this image:

http://public.dhe.ibm.com/services/us/igsc/idoctor/iDocInstallFull.exe

2. Extract the files to a directory, but don't run the install yet when it appears.

3. Download the desired QMGTOOLS images from here (these are the qmgtool*.savf)

   https://public.dhe.ibm.com/services/us/igsc/has/

4. Rename the qmgtoolxy0.savf* save file(s) to MGVxRy.savf and place in the same directory as #2.

5. In the iDoctor install on the welcome screen, click the box to **Install Must Gather Tools,** and point at this directory (**User-defined dir** option) and click the **Reload** button to pick up the changes. Then proceed as normal with installation.

# 2.4 Manual install steps

This section describes the steps to install iDoctor on a system running IBM i 7.2 or higher.  Using the GUI install wizard is preferred in most instances but if this is not possible, these steps are the only other way to get iDoctor on the desired system.

Information on installing QMGTOOLS can be found here and is no longer covered in this section:
https://www.ibm.com/support/pages/qmgtools-how-check-and-update-qmgtools

**NOTE: These steps <u>DO NOT</u> apply to 7.1 and earlier releases.  Please see the applicable older version of the documentation for those instructions.**

**Requirements:**
1. The user profile performing the installation must have *SECADM, *ALLOBJ special authorities. Otherwise, all objects may not be restored properly.

2. The system value QALWOBJRST must be set to *ALL or certain objects will not be installed properly.  Temporarily change this system value, if necessary, in order to perform this install. Remember to change it back to what it was when you started after the manual install has completed.

3. FTP on your IBM i must be enabled and ready for use. These steps use the Windows command prompt FTP command which does NOT support SSL FTP on port 990.  If you require this, then you will need to get the SAVFs onto your system using another method of your choice.

## 2.4.1        Windows command prompt FTP method

**Step 1**  Download the SAVFs that you intend to install from either
http://public.dhe.ibm.com/services/us/igsc/idoctor/iDocInstallFull.exe (all of them) or
http://public.dhe.ibm.com/services/us/igsc/idoctor/web/ (pick and choose desired ones.)

**Step 2**  Examine the directory where you created/saved the SAVFs to ensure that you have the required save files.

Each set of .savf files are used to install a particular iDoctor component as follows:

BA*.savf = Library QIDRGUI (GUI support library)
JW*.savf = Library QIDRWCH (Job Watcher and all subcomponents)
PA*.savf = Library QIDRPA (PEX Analyzer)

**Note:** From this point on some steps or commands issued will indicate which component they apply to. BA, JW, PA.  The GUI steps are required to install any of the components.

**Step 3**  Upload the files (matching the system's VRM) to the server.  This can be done manually or by using the uploadSAVFsToIBM.bat file.  You can modify this batch file to best suit your needs.
**<u>Uploading the SAVFs using the batch file "UploadSAVFstoIBMi.bat"</u>**
If using the batch file, you will pick the library to send the save files to and they will be created in save files named BAVxRy, JWVxRy and PAVxRy.

**<u>Uploading the SAVFs manually</u>**
If you don't use the batch file, then the following commands are needed to send the data to the IBM i.  In this example it is assumed that library QIDRINST is used to store the save files.
**Note:** *Please replace VxRy with V7R1, V7R2, etc.*

Run these commands from a green screen session to the IBM i:
    DLTLIB QIDRINST

    CRTLIB QIDRINST

    CRTSAVF FILE(QIDRINST/BAVxRy)

    **(JW)**
    CRTSAVF FILE(QIDRINST/JWVxRy)

    **(PA)**
    CRTSAVF FILE(QIDRINST/PAVxRy)

Now open a Windows Command prompt and issue the following commands in order to send the required save files to the server.  **Note:  Please replace values like <SystemName> with the system you need to FTP the save files to and VxRy with V7R1, V7R2, etc. depending on the OS release you are installing.**

**Note: If your system requires secure SSL FTP on port 990 then you will need to download and use software that allows this.   These steps are only for unsecure FTP using Windows Command Prompt FTP command.**

    CD C:\iDoctor\iDoctorInstall

    FTP <SystemName>

    BIN

    Cd QIDRINST

    Put BAVxRy.SAVF

    **(JW)**
    Put JWVxRy.SAVF

    **(PA)**
    Put PAVxRy.SAVF

**Step 4**  From a green screen window, run the following commands:

    CHGSYSVAL QALWOBJRST *ALL
        - you may want to note the existing value first so you can change it back when done

    **(BA/GUI)**
    DLTLIB QIDRSBA

    DLTLIB QIDRGUI

    RSTLIB  QIDRSBA *SAVF SAVF(QIDRINST/BAVxRy) MBROPT(*ALL) ALWOBJDIF(*ALL)

    QIDRSBA/INSTIDOCBA
        - verify that the message "CPF9898 - SUCCESSFUL iDoctor server Base install." is returned

    QIDRSBA/INSTSBSD JOBQ(QGPL/QIDRJW) CRTJOBQ(*YES) SBSD(QSYS/QIDRJW)
    CRTSBSD(*YES) POOLID(1)

 **(JW)**
DLTLIB QIDRSJW

DLTLIB QIDRWCH

RSTLIB QIDRSJW *SAVF SAVF(QIDRINST/JWVxRy) MBROPT(*ALL) ALWOBJDIF(*ALL)

QIDRSJW/INSTIDOCJW
   - verify that the message "CPF9898 - SUCCESSFUL iDoctor server Job Watcher install." is returned by the command.

**(PA)**
DLTLIB QIDRSPA

DLTLIB QIDRPA

RSTLIB QIDRSPA *SAVF SAVF(QIDRINST/PAVxRy) MBROPT(*ALL) ALWOBJDIF(*ALL)


QIDRSPA/INSTIDOCPA
   - verify that the message "CPF9898 - SUCCESSFUL iDoctor server PEX Analyzer install." is returned by the command.

**Step 5**  From a green screen window, run the following commands:

DLTLIB QIDRINST

DLTLIB QIDRSBA

DLTLIB QIDRSJW

DLTLIB QIDRSPA

**Note:** The required PTFs listed on the website must also be loaded and applied for the applicable component and OS release before collecting performance data.

If you are unable to complete the manual installation, contact idoctor@us.ibm.com for assistance.

# 2.5  Uninstall

## 2.5.1      Server Uninstall (via GUI)

To remove iDoctor from an IBM i, several objects and libraries created during the installation must be removed.

From the GUI, within the IBM i Connections View, you may right-click the desired system to remove iDoctor from and then pick the "Uninstall iDoctor" menu option.
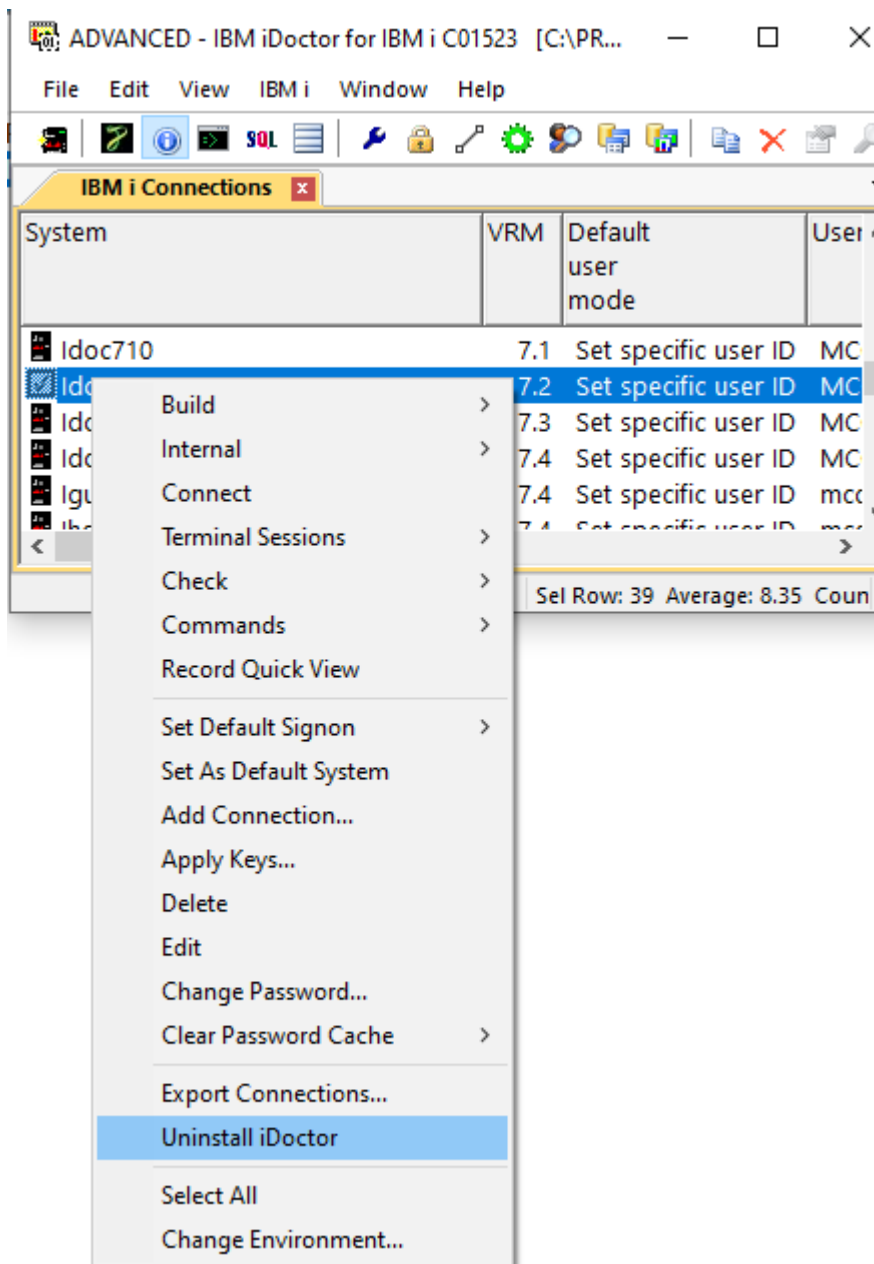
You will be asked to confirm this before continuing:

A CL program called QIDRUNINST is called which performs the actual uninstall of the iDoctor server-side objects and the status of that program and job log is available in the GUI from the view shown at the bottom of the screen (just right-click the view and use the appropriate menu to display the job log).

## 2.5.2        Server Uninstall (via green screen)

If you don't have the GUI installed, then simply find *PGM QIDRUNINST in QIDRGUI

Assuming it exists, then copy that program to QTEMP and then call it.

CRTDUPOBJ OBJ(QIDRUNINST) FROMLIB(QIDRGUI) OBJTYPE(*PGM) TOLIB(QTEMP)

CALL PGM(QTEMP/QIDRUNINST)

This program upon completion may complain about 1 or more objects not being removed.  This is normal because several objects may not actually even exist.  But to check that the only way is to review the log manually and ensure everything you wish to remove has been deleted.  Any locks of course would prevent that.

If that program does NOT exist, then delete all libraries named QIDR* and that will remove 99% of iDoctor from your system.   Of course, keep in mind this may also delete user data you may or may not care about in these libraries so be careful with this.  If you need further assistance with this contact idoctor@us.ibm.com.

## 2.5.3      GUI Uninstall

To remove the iDoctor GUI uninstall it just like any other GUI application on Windows.

On Windows 7 or higher, use the Control Panel -> Programs and Features option, then look for the IBM iDoctor for IBM i program entry in order to remove it.

If you need to run the iDoctor GUI uninstall program in a batch process, then call the iDoctorUninstall.exe with -silent command line parameter like this:
iDoctorUninstall -silent

This will hide all message boxes and prompting.  The uninstall program is installed in the same directory where iDoctor was installed (specified at install time).

**Note:** The uninstall program will not remove iDoctor from all locations it has been installed in the case where iDoctor has been installed in different directories.  To do so, this will need to be done manually by deleting the directory iDoctor is installed to. Typically this will be under either C:\iDoctor\ or under C:\Program Files(x86)\IBM\iDoctor

# 2.6 Applying access codes

There are three ways to authorize use of iDoctor:

**Option 1**  Provide the access code using the GUI.

1.  Make a connection in the IBM i Connections View to your IBM i.  Right-click it, then use the Add connection menu and define the new connection.
2.  Connect to the system (double-click it.)
3.  In the components window there is an Access code text box at the bottom of the screen that can be used to apply keys.  Copy and paste into there and press Apply (one key at a time.)
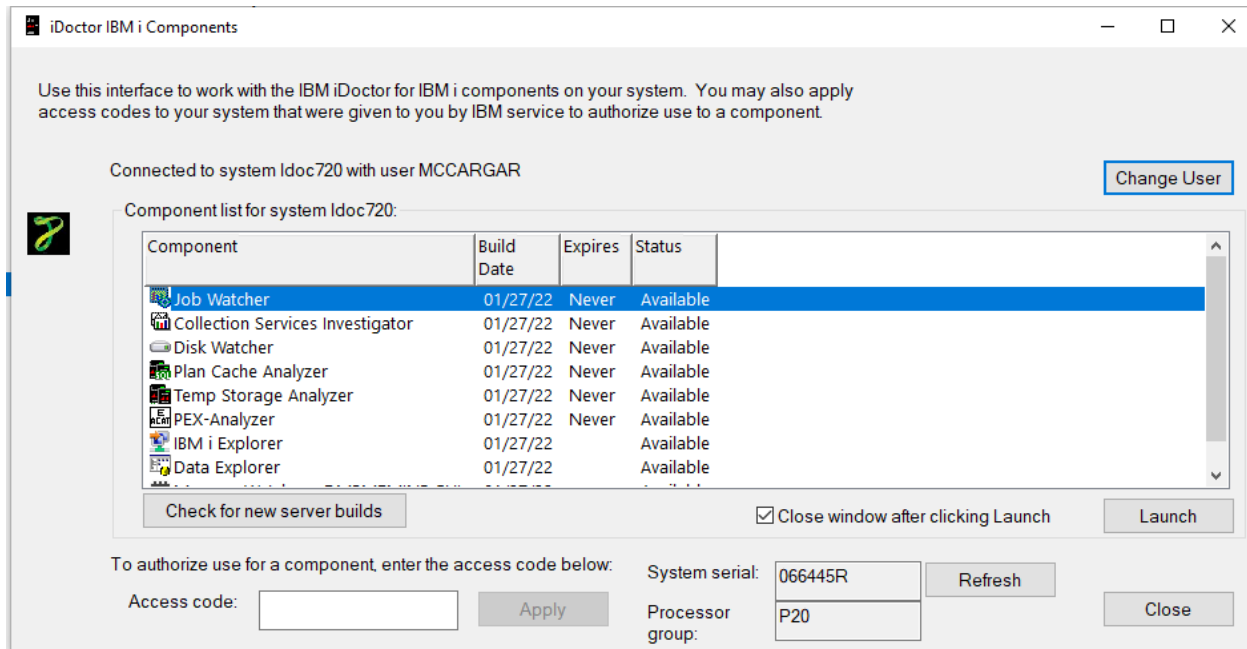
**Option 2**  By using the green screen command QIDRGUI/ADDPRDACS.

1. Open an interactive session to the server:
2. Type QIDRGUI/ADDPRDACS and press F4
3. Copy/paste (or type in) the access code that you were given by IBM Support.
4. Press enter.

**Option 3**:  Use the **Apply Keys** menu from the IBM i Connections View.

1. Select one or more LPARs to apply keys on and right-click and use the Apply Keys menu.
2. Copy and paste the email received from IBM into the bottom text box of this screen.  If you did not receive the keys directly from IBM you can request them using the email address idoctor@us.ibm.com or press the Email Format button to see the format that the email needs to be in order for this function to work correctly.
3. Press the Apply Keys button.
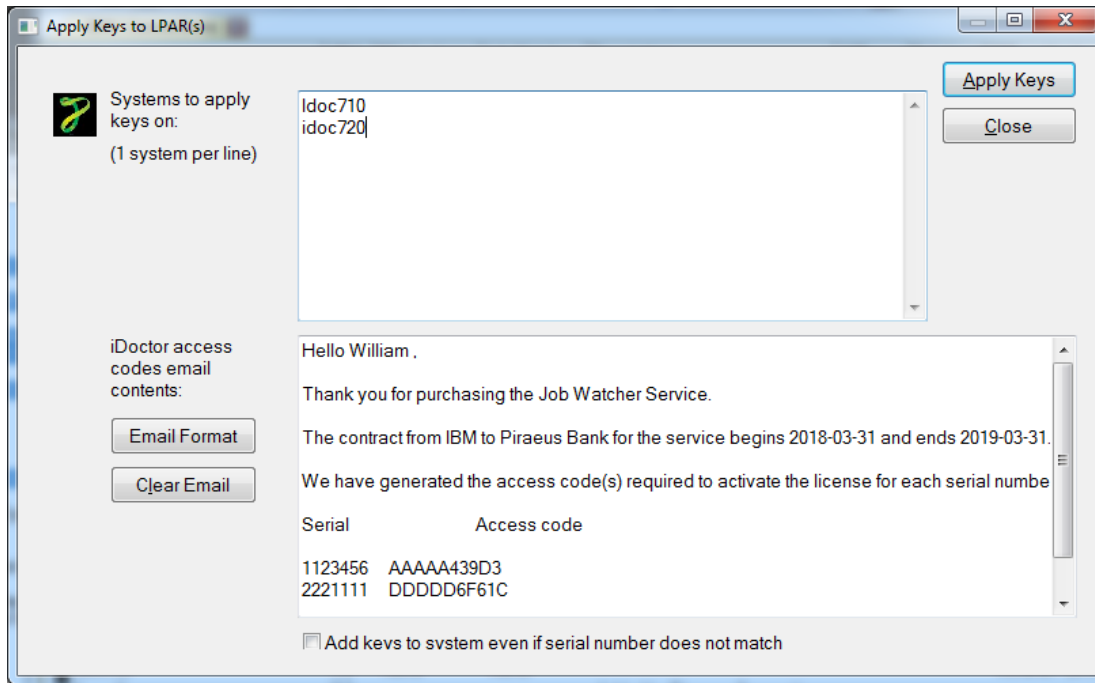
You are now authorized to use IBM iDoctor for IBM i. If you are using the tool with an evaluation code, your access will expire 45 days from the date it was created. **Note:** if you already had a trial code previously and request a 2nd one, the duration of the code you receive may be less than 45 days at the discretion of IBM.

## 2.7 Viewing access codes

To view existing access codes that have already been applied to an IBM i:

1) Open an IBM i component under the IBM i Connections View.

2) Right-click the component icon (i.e. Job Watcher or PEX Analyzer icon at the top of the tree) and use the Properties menu.

3) The applied keys are listed under the Server section of the window.
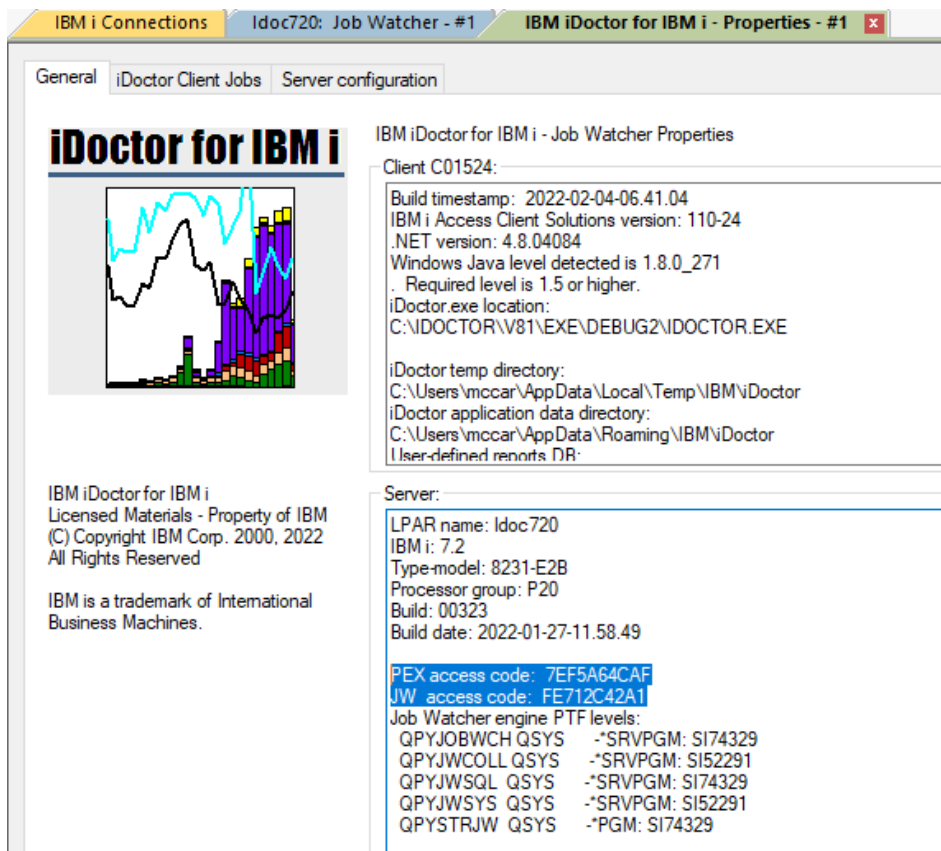
*iDoctor Properties - General*

---

## 2.8 GUI install history

In order to view a history of GUI client builds installed on the PC view the application properties and look at the bottom of the data in the client section. Click the help icon on the main window toolbar or use the Help -> About menu or use the component -> Properties menu to access the application properties

This information includes the date the build was installed, the build number and the location it was installed to.

**Note:** This information is only removed if the user presses the Wipe install info button on the application properties screen. It is not removed by uninstalling the iDoctor GUI.
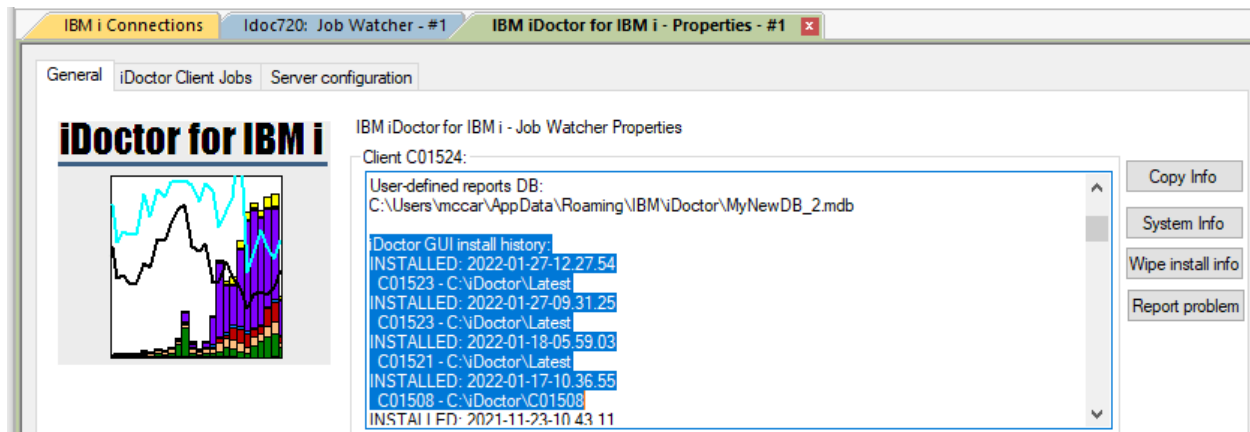


*iDoctor Properties - General*

## 2.9 PTF Installation

Visit the Fix Central website if you need assistance with installing PTFs.

# 3  iDoctor for Performance Analysis

This chapter covers the components of performance and how they can be analyzed using the iDoctor tools.

## 3.1 Components of Performance

**Note**:  Some images and wording in this chapter have been taken from Chapter 1 of the Job Watcher Redbook.  You can find the original/complete text at
http://www.redbooks.ibm.com/redbooks/pdfs/sg246474.pdf

Several different components may affect performance on the server. These components consist of:

- CPU
- Disk I/O
- Other (seizes, locks, gates)

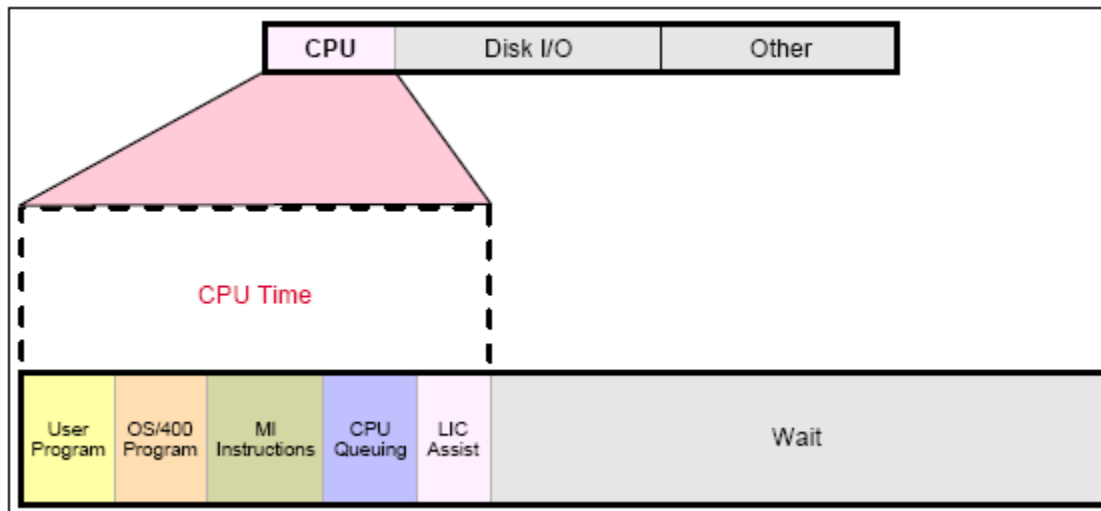A further breakdown of CPU components might look like Figure 3-1.



*Figure 3-1 CPU components*

**Note:** LIC assist tasks are defined as tasks running in the background doing work on behalf of a requesting job. Examples are DBL3xxx tasks that handle asynchronous disk I/Os on behalf of jobs, load/dump tasks (LD component) on behalf of save/restore tasks, and on behalf of other LIC tasks.

MI in these figures and elsewhere to refer to Machine Instruction–level instructions (below the operating system level), which is referred to in more current documentation as the Technology Independent Machine Interface (TIMI).

A further breakdown of Disk I/O components might look like the following figure:
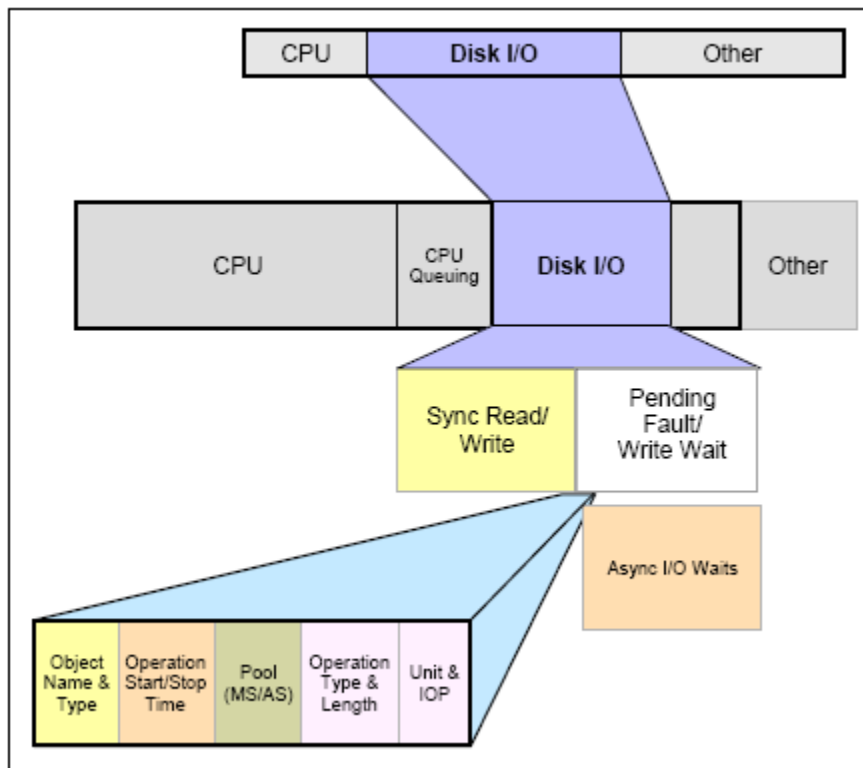
*Figure 3-2 Disk components*

Pending (page) Fault/Write *wait* applies when the system has determined to write some main storage data/program code to disk and there is a wait to actually perform that write to disk. A fault is the result of needing to bring new data or instructions into main storage when there is not enough available space, so least-used data or instructions have to be written to disk first.

Note that asynchronous I/O can also become momentarily synchronous (*Async I/O Waits*) because, for example, the target disk is already busy performing previously issued I/O operations.

A further breakdown of the Other components of performance might look like this:
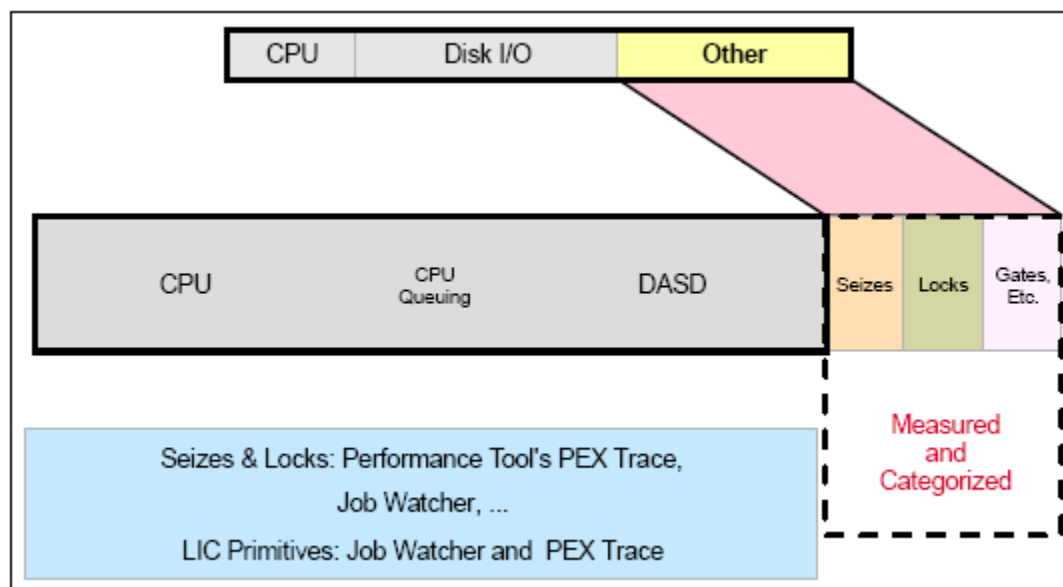


*Figure 3-3 Other components*

Locks include database record locks and object locks.  These locks occur above the MI in the operating system.

Object lock contention is the conflict between threads involving objects.  The OS will frequently obtain locks to perform many common operations like: opening a file, creating/deleting options, moving objects to another library, and changing object ownership.

Seizes and gates (a low-level synchronization function) are LIC-level lock/unlock or seize/release mechanisms. Job Watcher and PEX Analyzer provide more details, including the job/thread waiting on an object, the job/thread holding the object, and the object name and type. Job Watcher measures and categorizes gates (wait and related information).

**Note:** Seizes and gates occur below the MI (TIMI) and do not time out. Locks occur above the MI and will eventually time out.  Job Watcher can show very long seizes and gates well in the iDoctor GUI.  In rare situations, if a system has a large numbers of jobs in seize contention it is not uncommon for these seizes to last for minutes without any CPU use occurring.
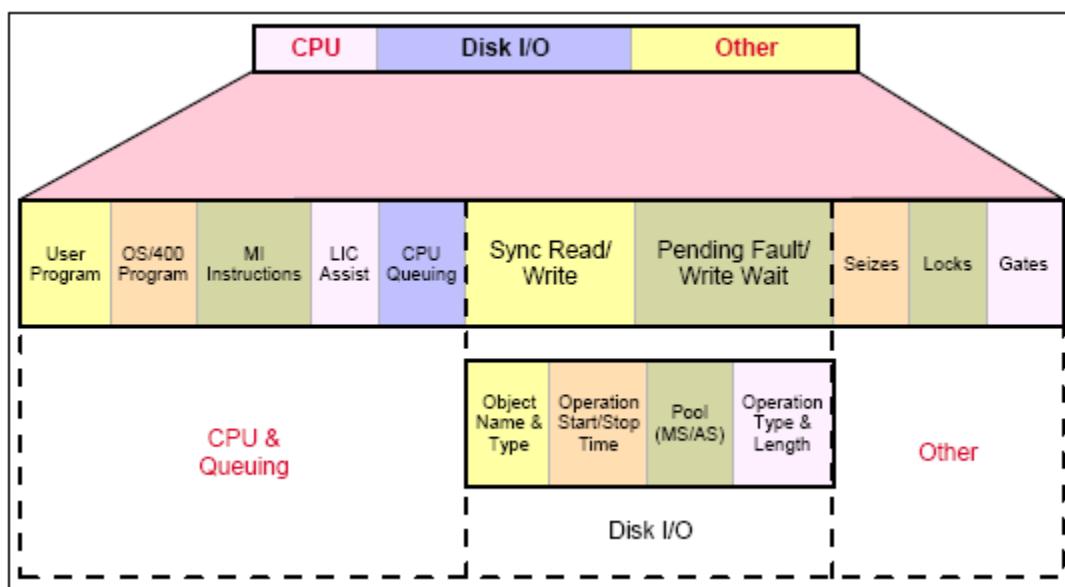


*Figure 3-4 Summarization of Performance Components*

Figure 3-4 represents a moderately detailed summarization of the content in the preceding three figures on CPU, Disk I/O, and Other.

One or several of these components can be a bottleneck and a problem for some transactions. While the thought of replacing the entire system with a newer, faster model may be an alternative, it might not be the most effective or efficient use of time and resources. With the help of the proper tools, performance can be improved by diagnosing these bottlenecks. By properly balancing system resources, all jobs can run at their optimal level with minimal resource conflicts. Job Watcher , Disk Watcher and PEX Analyzer measure and present all of these components.  The strengths of each iDoctor component and how they may be used to help you balance your system resources is covered in the next sections.

# 3.2 Job Watcher

Job Watcher provides information about all 3 components of performance: CPU, Disk I/O and Other (waits/seizes/gates/locks).   It is a tool best used for wait analysis but it can also produce useful graphs for CPU and Disk I/O analysis as well.

Job Watcher consists of:

- Tools for collecting data
- Tools for analyzing and viewing the collected data

Job Watcher returns near-real-time information about a selected set of jobs, threads, or licensed internal code (LIC) tasks. It is similar in sampling function to the system commands WRKACTJOB and WRKSYSACT in which each refresh computes delta information for the ending snapshot interval. In the Job Watcher, these refreshes can be set to occur automatically, even as frequently as every 5 seconds. Better yet, Job Watcher harvests the data from the jobs/threads/tasks being watched in a manner that does not affect other jobs on the system while it is collecting.

Job Watcher collected data includes the following:

- Standard WRKSYSACT type information
  CPU
  DASD I/O breakdown
  DASD space consumption
  Current user profile
  And more
- Expanded details about types of waits and object lock/seize conditions
- Last run SQL statements syntax
- Program/procedure call stack, up to 1000 levels deep

- Job Watcher also includes some data not available anywhere else *in real time*:
  Seize time (this includes objects being locked at the operating system level and objects being seized at the microcode level)
    - Holder and waiter job and thread
    - Specific LIC block point ID (also referred to as ENUM)

  A breakdown of all other waits that occurred
    - Details about the current wait:
    - Duration of the wait
    - Object being waited for
    - Conflicting job/thread/task information
    - Specific LIC block point ID

- Call stacks
- SQL statements, host variables, prepared statement arrays, open cursors
- Communications data
- Activation group statistics
- J9 JVM statistics

The data created by the tool is summarized in many different types of reports and graphs via the iDoctor GUI.  The client provides a quick picture of what is happening either system wide or on a per-thread basis when multiple different threads are being analyzed.

The GUI provides the flexibility to select one or more jobs or a time range and drill down for the details while the collection is in progress or after it has ended.

A typical situation for deciding to use Job Watcher is for a job that is taking a long time to run but is using hardly any CPU resource and disk I/Os are not particularly excessive. Job Watcher is an excellent tool to help you determine job waits, seizes, and other types of contention. Identifying why a job or multiple jobs or threads are not doing anything when they should be, is a primary situation to demonstrate a key set of Job Watcher capabilities.

**Tip:** Run Job Watcher when your system is running normally, and you are not having performance problems. This gives you a health check of your system so that when it does have performance problems, you have a baseline to make comparisons to. You might want to run Job Watcher over your system for a

period in the morning, afternoon, and possibly during the evening when you might have more batch-type jobs running.

You could also run Job Watcher over specific key jobs on your system when they are running well for baseline-comparison purposes.

## 3.3 Collection Services Investigator

Collection Services Investigator provides information about all 3 components of performance: CPU, Disk I/O and Other (waits/seizes/gates/locks).   It is a tool best used for wait analysis (ideally in conjunction with Job Watcher) but it can also produce useful graphs for CPU and Disk I/O analysis as well.

Collection Services Investigator provides the user with the ability to analyze the performance database files produced by Collection Services.  Collection Services is like Job Watcher in the statistics collected, but the primary difference is the interval size in Collection Services is usually much longer (5-15 minutes vs 5 seconds in Job Watcher).

Collection Services is a no-charge part of IBM i that continually collects sets of performance categories on the system.  The data is collected into management collection objects that must be converted into database files before analysis with Collection Services Investigator can be performed.  Either use the CRTPFRDTA command or the Collection Services functions within IBM Systems Director Navigator or System i Navigator to create these database files.

Collection Services does not provide the following metrics that Job Watcher collects:
- Call stacks
- SQL statements
- Activation groups
- JVM statistics
- Object waited on
- Holding thread

Despite this Collection Services is useful for a big picture look at how a system has been performing over longer periods of time than what is typically collected by Job Watcher (days/weeks instead of minutes/hours).

Collection Services Investigator does provide many types of data not found in Job Watcher (or some other tools):
- TLBIEs
- Multiple LPAR stats
- Disk graphs
- Memory pool graphs
- External storage statistics
- Save/Restore
- IASP bandwidth estimations
- Disk/hardware configuration

## 3.4 Disk Watcher

Disk Watcher provides the user with the ability to collect either a statistical summary of disk performance data or a trace of all disk I/O events that occur on a system.  The trace mode is recommended as it provides more options for analyzing the data and determining potential disk problems.

The Disk Watcher GUI provides many graphs with drill downs for each mode of collection (statistical or trace).  Using Disk Watcher the user can take a trace, then summarize the trace data into an interval size desired for the purpose of easily graphing the statistics at either or broad or detailed level.

Disk Watcher is available at releases V5R4 and higher.

# 3.5 PEX Analyzer

PEX Analyzer assists the user with the analysis of PEX (Performance Explorer) data.  PEX is a component of IBM i.  The server-side of PEX Analyzer includes a command STRPACOL that simplifies the process of creating a collection by wrapping the IBM i commands ADDPEXDFN, STRPEX and ENDPEX into one step.

The client side of PEX Analyzer includes many graphing and query capabilities that allow a user to quickly identify performance bottlenecks.

This component is available for a trial evaluation or purchase via this website.

# 3.6 Must Gather Tools

Must Gather Tools is designed to assist IBM support personnel quickly and easily capture data needed to solve problems of a variety of types.  This is a green screen menu driven tool.

After restoring the QMGTOOLS library, add the library to your library list and use the GO MG command to start using this interface.

# 3.7 Performance Analysis Using the iDoctor GUI

All iDoctor components provide a similar GUI experience when analyzing performance data.  Performance data resides within a collection.   Each component in iDoctor shows the libraries and collections that exist on the current system that contain data of the desired type (Job Watcher displays Job Watcher collections).  The collections contain the graphs and tables available categorized based on the different types of statistics available in the data.

The hierarchy of these elements looks like this:

System/Component
      Libraries
             Collections
                   Report folders
                        Reports (graphs and tables)

Graphs in iDoctor generally consist of one of three distinct types:

**Collection-wide by time interval**
These graphs show some set of statistics across the entire collection over time.  The Time interval size (collection interval size, 30 secs, 1 min, etc) is configurable by clicking on the clock icon on the toolbar.  This gives the effect of zooming in or out by showing more or less detail.
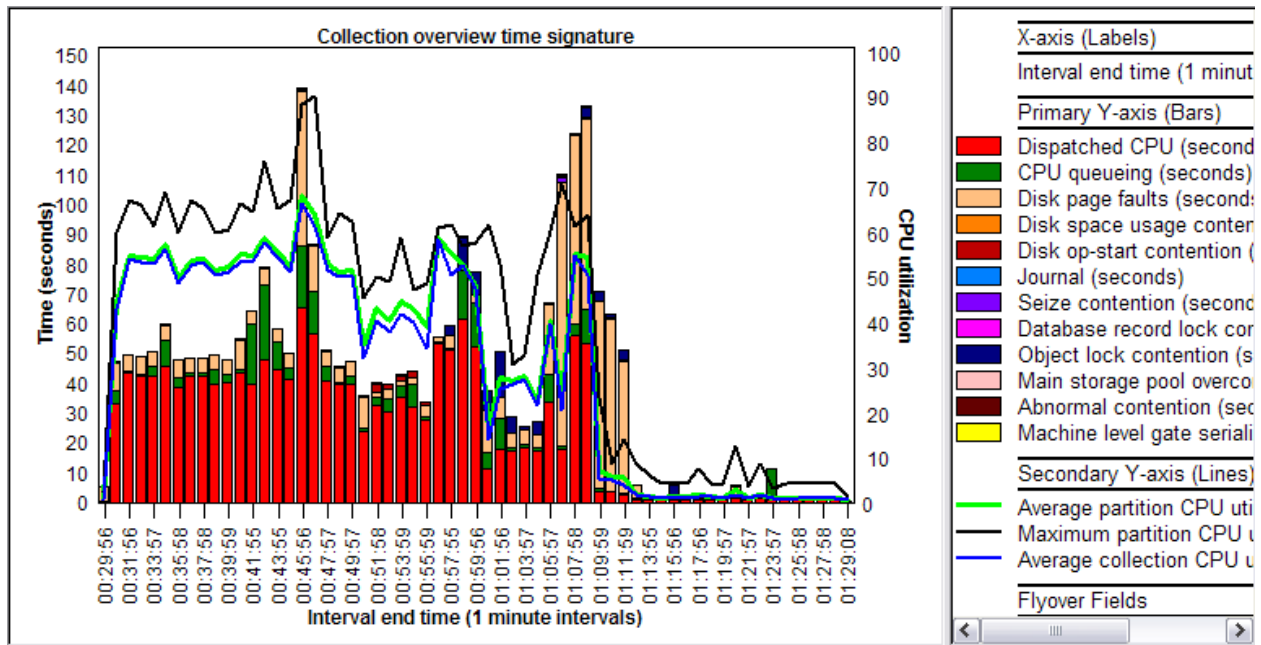
*Collection-wide by time interval graph example*

**Rankings graphs (such as thread, job, disk unit or pool)**
These graphs rank objects by statistics for the desired time period. The time period could be the entire collection or the selected time interval that was drilled into from the previous graph type.
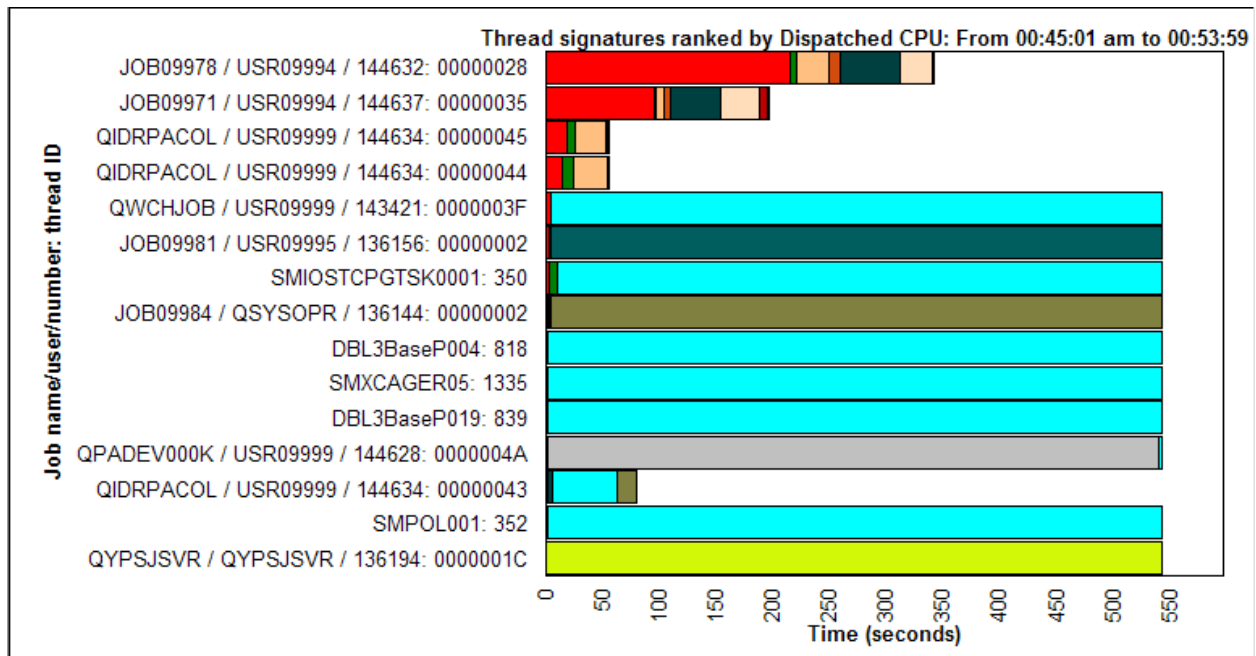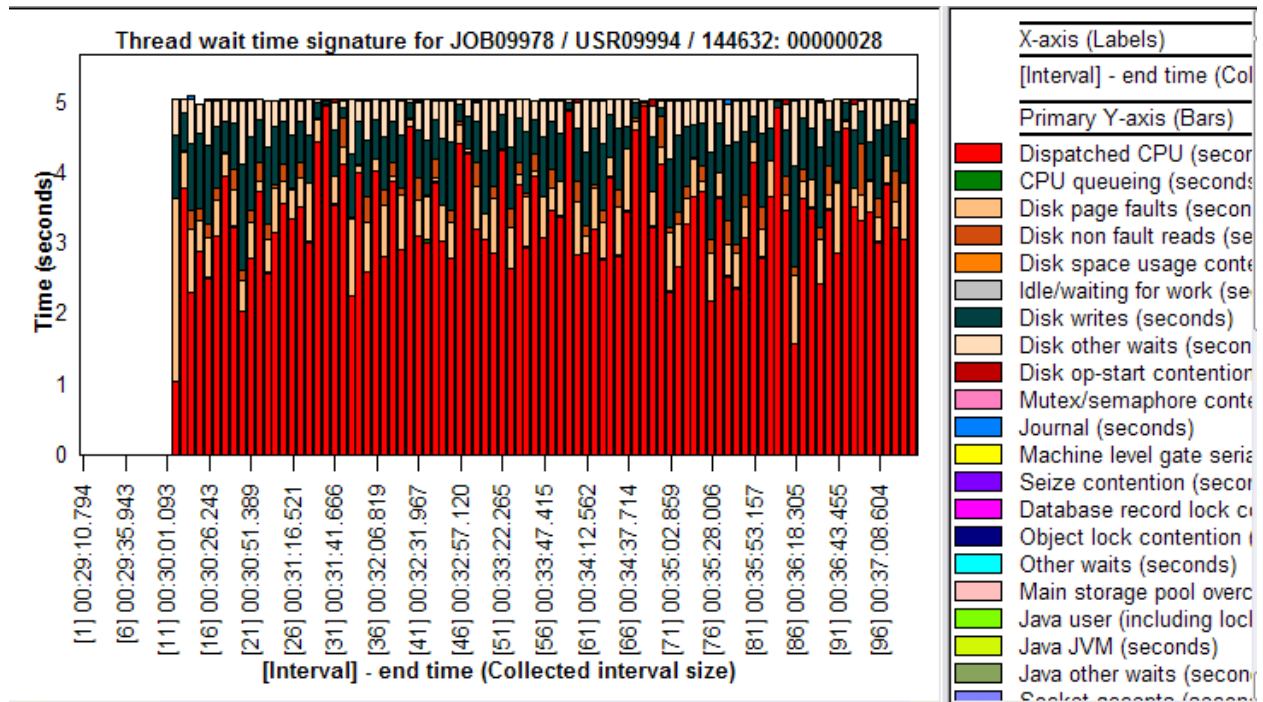


*Rankings graph example*

**Selected object(s) by time interval**
These graphs are usually a drill down from the previous graph after selecting one or more objects. They are very similar to the collection-wide by time interval graphs with the key difference that they only show data for the objects selected.

This graph often provides the ability to drill up to the previous graph for the selected time period. This gives the user the ability to make comparisons with other objects (threads or disk units for example).

*Selected object(s) by time interval graph example*