



World Community Grid

Mass Install Considerations

for the BOINC client

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1 Overview

The purpose of this document is to provide an overview of items that should be reviewed when considering a mass install of the BOINC client. Because there are many techniques for deploying software to workstations, providing a comprehensive review of these techniques is out of the scope of this document. This document will thus focus on the three most common ways that mass installations are performed. It also will provide details on the features of the BOINC client that support mass install, and the files and directories that need to be protected from being erased or overwritten. This document is targeted at technical users who are familiar with the mass deployment tool utilized by their organization.

2 Installation Scenarios

The following are the three most common ways that mass installations are performed that will be covered in this document.

2.1 Scenario #1 - Automated deployment using a software distribution system

This scenario is often utilized by a business or corporation that has an existing software distribution system such as Microsoft SMS or Microsoft Group Policy. This document discusses how to prepare the files and executables so that they can be loaded into a distribution package. It also describes how to customize some of the settings on the client and have it automatically attach to World Community Grid with a specific member name.

2.2 Scenario #2 - Protected systems where the disk is re-imaged frequently (such as using Deep Freeze or Ghost)

This scenario is often utilized by a university computer lab or other environment where the computers' hard drives are frequently re-imaged. This document describes what needs to be created and placed in a section of the hard drive that is protected (thawed) from the re-imaging software. It also describes what configuration files need to be present in the BOINC installation directory to ensure that the client uses the files stored in the protected (thawed) section of the hard drive.

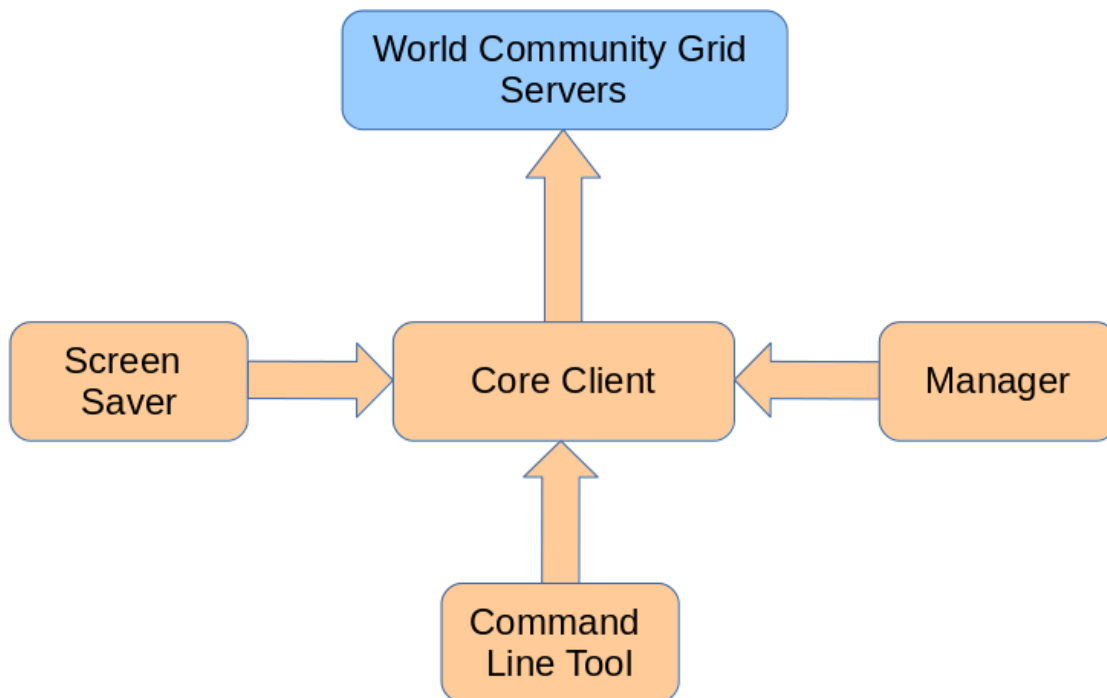
2.3 Scenario #3 – High Throughput Computing systems with backfill capabilities

This scenario is often utilized by a university computer lab with software similar to Condor running on their systems. These systems will need to have a backfill capability to allow BOINC to run on idle CPU systems.

3 The BOINC client

3.1 Applications

The BOINC client actually consists of four separate but interacting applications. They are represented in the diagram below:



The **core client (boinc.exe)** is the central controller for the BOINC client. It handles communication with World Community Grid's servers, downloads work units, returns results and manages the starting and stopping of the science applications to comply with the preferences set for the client.

The **manager (boincmgr.exe)** is a graphical user interface that allows the user to view the current state of the core client, the work units that have been downloaded, the applications that are running and the graphics for running the application. It also provides the ability to change preferences locally and temporarily suspend the running of the application. All communications between the manager and the core client occur over TCP/IP. (See the security section of this document for additional information.)

The **command line tool (boinccmd.exe)** does the same thing as the manager, except that it does it via the command line and only displays information as text. This is most useful if the client has been installed on a Linux machine that is being accessed remotely. All communications between the command line tool and the core client occur over TCP/IP. (See the security section of this document for additional information.)



The **screen saver** renders the application graphics as a screen saver. In the event that the application graphics are not available, it will display World Community Grid's logo and text describing the application running and the progress of the current work unit.

3.2 Versions

At the time that this document was written, World Community Grid was using release 7.14.2 of the BOINC client.

World Community Grid produces Windows and Mac versions of the BOINC client that use World Community Grid's branding. These can be downloaded from our website.

We recommend that you install the Linux version from the software repositories used by your Linux distribution.

The Android version is downloaded via the Google Play store.

Downloads and detailed instructions for installation of all versions are available at <https://www.worldcommunitygrid.org/reg/ms/viewDownloadAgain.do> (registration required)

World Community Grid will periodically update the version of the BOINC client as new features are added to the software. The Windows and Mac versions of the software are not self-updating and you will need to take action to update those versions of the software when new versions become available.

3.3 Install Methods for Windows

The client can be installed as either a service or as a normal program launched during user login. Installing it as a normal program is the most common approach. However, if installed as a service, the program can be run even when no user is logged into the computer. We describe how to install the software using command line options in the "Deployment using software distribution system (Scenario #1)" section. We describe how to install the software using a normal GUI install in the "Deployment on protected systems where the disk is re-imaged frequently (such as using Deep Freeze) (Scenario #2)" section.



4 Deployment using software distribution system (Scenario #1)

The instructions below provide details on how to prepare World Community Grid's BOINC client so that it can be deployed silently from the command line. After performing these modifications, the command line will install the client and automatically attach to World Community Grid using the specified member.

4.1 Command Line Properties

The installer has various options available on the command line that allow for different configuration settings to be set during installation. The following two are the most significant for mass deployments:

1. **ENABLESCREENSAVER:** Default is 1 which sets the operating system to use the World Community Grid screen saver. If you wish to not set the screen saver, then include `ENABLESCREENSAVER=0` in the commandline.
2. **ENABLEPROTECTEDAPPLICATIONEXECUTION3:** Default is 0. This is used to set application sandboxing for improved security. It also sets whether or not to run as a service. If you want to enable protected execution and run as a service, then include `ENABLEPROTECTEDAPPLICATIONEXECUTION3=1` on the command line.

For additional command line options please contact support@worldcommunitygrid.org or visit https://boinc.berkeley.edu/wiki/Creating_custom_installers#Installer_properties

4.2 Installer Filename

The installer filename is read during the installation process and can provide the World Community Grid account that the client should be registered under. The format of the filename is:

```
wcg_7.14.2_windows_intelx86__22_WEAKACCOUNTKEY.exe
```

The text `WEAKACCOUNTKEY` should be replaced with weak account from the account you want to use. The weak account key can be found on <https://www.worldcommunitygrid.org/ms/viewMyProfile.do>.

For example, if the weak account key obtained from the link above was:

```
1158_c5a5d4b34efead13e8dd7a0c3bdc3e20
```

then the file name would be:

```
wcg_7.14.2_windows_intelx86__22_1158_c5a5d4b34efead13e8dd7a0c3bdc3e20.exe
```

4.3 Execute the installer

Now that all the options have been determined, the following command can be used to install the World Community Grid BOINC client (make sure to replace `WEAKACCOUNTKEY` with your weak account key!)

```
wcg_7.14.2_windows_intelx86__22_WEAKACCOUNTKEY.exe /S /v"/qn  
ENABLEPROTECTEDAPPLICATIONEXECUTION3=1"
```

As part of the installation, the computer will be rebooted. If you need to disable this, you can run the following command. Please note that the computer **MUST** be restarted, before the software can start running.

```
wcg_7.14.2_windows_intelx86__22_WEAKACCOUNTKEY.exe /S /v"/norestart /qn  
ENABLEPROTECTEDAPPLICATIONEXECUTION3=1"
```



Please note that there are several installation types and additional installation options available for World Community Grid's BOINC client. Please view this page to see them:

https://boinc.berkeley.edu/wiki/Creating_custom_installers or contact support@worldcommunitygrid.org

If using any of these other options, please test them to make sure that they work as expected.

The BOINC client will not start automatically after running this command. It will start after reboot.

4.4 Other options on installations

If you want to prevent the agent from showing the BOINC manager and tray icon then you will need to remove the calls to them in the Windows Registry.

```
REG DELETE HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Run /v boincmgr /f  
REG DELETE HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Run /v boinctray /f
```

5 Deployment on protected systems where the disk is re-imaged frequently (such as using Deep Freeze) (Scenario #2)

This installation scenario is used in a scenario where a computer system will be re-imaged on a regular basis. This is likely to be in a computer lab, library or some other shared facility where many people will have access to the computer. This describes installing the software in a way that will allow it to run as a service so that it will run even if no user is logged into the system.

5.1 Install World Community Grid's BOINC client onto the disk image

1. Download the latest version of the software
2. Run the installer.
3. On the Welcome screen click 'next'
4. Accept the Berkeley Open Infrastructure for Network Computing license terms. Click 'next'.
5. On this next screen, click the 'Advanced' button. Uncheck the screen saver option, check the 'install as a service' option, uncheck the 'allow all users on this computer to manage'. Note the location of the 'Data Directory'. Then click 'next'.
6. Click 'Install'
7. Uncheck the 'Launch the BOINC Manager' option if presented.
8. Click Finished
9. Do not allow the computer to restart
10. Go to the data directory. Delete the file called project_init.xml.
11. Create a file called account_www.worldcommunitygrid.org.xml in the data directory that you noted above. It should have the following contents:

```
<account>
  <master_url>http://www.worldcommunitygrid.org/</master_url>
  <authenticator>weakaccountkey</authenticator>
</account>
```

Please note that the proper value for weakaccountkey can be found at <https://www.worldcommunitygrid.org/ms/viewMyProfile.do>. You will find it near the bottom of the page next to the text that says 'weak account key'.

12. Right mouse click on the account_www.worldcommunitygrid.org.xml file. Go to the security tab and add the following groups: boinc_admins (grant Full Control, Modify, Read & Execute, Read, Write) and boinc_users (grant Read & Execute, Read).

At this point the disk image is ready to go. Please save the disk image and then test that it works as desired.

5.2 Optional - Alternative installation steps to improve contribution

The steps described above will yield a nice contribution for each machine. However, the work that has been done on workunits that are in the middle of being processed at the time that the machine is re-imaged will be lost. If you have the option of maintaining some storage that is preserved during the re-imaging process, then you can avoid losing this work. To do this, make the following changes to the above steps:



1. During step 5 above, you should follow the instructions there, but also click on the 'Change' button next to Data Directory. Change the data directory location to the storage location that is preserved during reboot.
2. During step 11 above, make sure that you place the account_www.worldcommunitygrid.org.xml file in this new Data Directory location.

5.3 Optional – Disable the Automatic Start of the Manager

Each time the computer is started, the core client and the manager will start independently. The core client must run, however, the manager is not necessary when you have installed the software as a service as described above. If you wish to not have the manager automatically start, then remove the registry key:

HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Run\boincmgr

6 Backfill Jobs (Compute Clusters) (Scenario #3)

Compute clusters often have periods where they are idle or have low utilization. These periods can be used to run jobs from World Community Grid.

One common software platform used to manage compute clusters or distributed clusters is Condor. Beginning with Condor version 6.7.17, Condor can be configured to run backfill jobs whenever the condor_startd has no other work to perform. These jobs are considered the lowest possible priority, but when machines would otherwise be idle, the resources can be put to good use. Information about setting up the software under Condor can be found here:

https://research.cs.wisc.edu/htcondor/manual/v8.6/3_14Setting_Up.html#SECTION00414900000000000000

If you are using a different type of cluster computing management software, the techniques described in the Condor documents will still be instructive. If you require further assistance please contact support@worldcommunitygrid.org and we would be happy to help.

7 Managing the behavior

Several items that can be configured in the BOINC client can be used to minimize and eliminate the impact of the BOINC client running. These options can be controlled from the website on this page: <http://www.worldcommunitygrid.org/ms/device/viewProfiles.do>. Each computer is initially assigned to the 'Default' profile. This profile can be customized to give the desired behavior. You also can create additional profiles; assign some computers to one profile and other computers to another profile. This allows you to customize the behavior of your computers according to your needs.

The most important features that can be controlled from these profiles are:

- **CPU Throttles:** These allow you to limit when the client runs research projects. Some key ones are:
 1. "Use no more than: x% of processor time" This causes the BOINC client to only use a certain percentage of the computers' CPU time.
 2. "Suspend work if CPU usage is above x% of cpu" This causes the BOINC client to stop running research work if the CPU usage of non-BOINC work is greater than this percent.
 3. "On multiprocessors, use: x% of processors" This causes the BOINC client to only use X percent of the available processing cores on the computer.
- **Memory Throttles:** These allow you to limit the amount of memory the BOINC client uses for research applications.
- **Bandwidth Throttles:** These allow you to limit when and how much bandwidth the client uses transferring input and output data files and applications to/from the World Community Grid servers:



1. “Maximum upload/download rate: X Kbytes/sec” This limits the speed at which the client transfers files.
 2. “Transfer at most: X Mbytes every Y days” This sets an upper limit on the amount of data that can be transferred over a period of time.
 3. “Connect to the internet only between X and Y” This lets you set the time of day that the client is allowed to communicate with the project servers.
- Behavior Throttles: These allow you to limit when the client runs research projects:
 1. “Do work while computer in use” This can limit processing to only when the user of the computer has not done anything on it for more than X minutes.
 2. “Do work only between the hours of X and Y” This allows you to limit the time of day when computers run.

8 Firewalls and Proxies

There are two firewall rules that need to be allowed:

1. The binary boinc.exe needs to be allowed to make outbound requests on ip address 169.47.63.74 on ports 80 and 443. This is required to communicate with World Community Grid’s servers.
2. The binaries boinc.exe, boinc.scr, boincmgr.exe and boinccmd.exe need to be able to communicate to 127.0.0.1 on port 31416 (some firewalls restrict ip traffic to the localhost).

The BOINC client also can be configured to communicate through Proxies. This is done by performing the following steps:

1. Open the BOINC Manager.
2. Click on the ‘Advanced’ button to go to the advanced view.
3. Select the ‘Advanced’ menu and select ‘Options’.
4. In the popup, select either the HTTP or SOCKS proxies as appropriate.

In certain circumstances, you may be prompted for the proxy information while you are attaching to World Community Grid.

You can also set the proxy after the client is installed via a command line tool. You will want to read up on the options for the command line tool here: https://boinc.berkeley.edu/wiki/Boinccmd_tool.

The proxy command that is needed for setting the proxy is `–set_proxy_settings`.



9 Security

The BOINC client was designed by the University of California under a National Foundation of Science grant. One of the design goals of the BOINC technology was to allow volunteers to contribute to multiple projects. As a result, a single computer can be attached to multiple BOINC projects such as World Community Grid.

When the BOINC core client is started, a file called `gui_rpc_auth.cfg` is created. This file contains a password. This password is checked by the core client any time that the BOINC manager requests information from the core client or sends it a message directing it to do something (such as suspend a workunit or attach to an additional project). In order to prevent the user of the computer from attaching to unauthorized projects, this file must be protected so that the end user cannot read or access this file. Additionally, the `cc_config` file can be modified to include a tag called `<disallow_attach>`. This will prevent users from attaching to other BOINC projects. . More information about this is available at https://boinc.berkeley.edu/wiki/Client_configuration#Configuration_file



Appendix I: Additional Detail on the BOINC client components:

The Core Client: https://boinc.berkeley.edu/wiki/BOINC_Client

The Manager: https://boinc.berkeley.edu/wiki/The_BOINC_Manager

The Command Tool: https://boinc.berkeley.edu/wiki/Boinccmd_tool

Client Files and configuration: https://boinc.berkeley.edu/wiki/Client_configuration

Appendix II: Other BOINC references:

The links below are for websites external to World Community Grid and BOINC. These are the pages and tools created by people as a way to contribute to the BOINC community. You are welcome to examine these as sources of information, but we cannot endorse or recommend these tools.

The BOINC WIKI

This is a WIKI dedicated to providing information to users of BOINC:

https://boinc.berkeley.edu/wiki/Main_Page