



## TECHNICAL MEMORANDUM

### Installation of GAMBIT Explorer UserApp

(Temporary Solution)

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**Date:** September 12, 2017  
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**Project:** GAMBIT

**To:** GAMBIT Consortium  
**From:** Ivan Galkin (GIRO)

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### SCOPE

This memo describes a temporary installation solution for GAMBIT Explorer UserApp software tool while a more suitable multi-platform web-based packaged installer is in preparation.

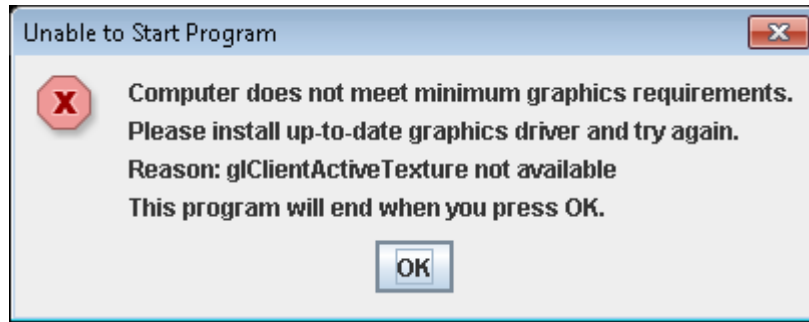
### PREREQUISITES

#### Hardware Requirements

GAMBIT Explorer uses NASA WorldWind geographic visualization libraries that rely on hardware support of its display functions in the display adapter of computer.



Most computers have 3D display adapters with required support of *DXTn rendering*. If installed GAMBIT Explorer fails to start because of incompatible hardware, purchase of a suitable 3D graphics card may be required.



Linux and MacOS users: Additional software configuration steps may be needed to enable hardware rendering inside OpenGL support layer, as described in Appendix A.

## Software Requirements

GAMBIT Explorer operates on Windows, Linux, and MacOS platforms with installed Java Runtime Environment (JRE) version 8 or later.

Typical error message when the active JRE on your operating system is outdated:

```
Exception in thread "main" java.lang.UnsupportedClassVersionError: edu/uml/giro/gambit/apps/GambitUserApp :
Unsupported major.minor version 52.0
    at java.lang.ClassLoader.defineClass1(Native Method)
    at java.lang.ClassLoader.defineClass(ClassLoader.java:800)
    ...
```

## Network Requirements

GAMBIT Explorer operates as a remote client that connects to Lowell GIRO Data Center (LGDC) over the Internet, using:

- **TCP/IP port 3306** for SQL-based request/reply traffic with GAMBIT Database and
- **URL wget transfers over HTTPS** secure protocol for user authentication



GAMBIT-X will not operate at locations where TCP/IP port 3306 is blocked in the firewall. Availability of the port 3306 connection from the host computer to WAN can be tested by an online tool such as <http://portquiz.net:3306/>.



On certain Linux and MacOS platforms, attempts to connect to LGDC over https cause errors of the missing certificates in Java trusted keystore. Please see Appendix B for additional instructions.

## INSTALLATION PROCEDURE

1. Download and unzip the latest GAMBIT Explorer installation file from the link provided on GAMBIT homepage:

<http://giro.uml.edu/GAMBIT>



GAMBIT Explorer generates various output files and places them in several subfolders of its home folder. User access for writing to the home folder is required for these export operations. Unzipping of GAMBIT Explorer package into access-controlled folders (/Program Files, /bin, etc.) is not recommended. Consider installing GAMBIT-X in a user folder of the OS.

2. Prepare user configuration files and place them in <**GambitX-home**>/**user** folder:
  - a. File **guest\_info.txt**, containing user credentials for Madrigal database of VTEC, written in the following two lines:

- 1) Your email
- 2) Your organization

*Example:*

```
John_Smith@university.edu
Our Fair University
```

- b. OPTIONAL: File **gambit\_info.txt** for the user-authenticated access to GAMBIT database at Lowell GIRO Data Center, containing two text lines:

- 1) Your login username
- 2) Your password

*Example:*

```
UOF
my-password
```



It is not required to become a registered user to connect to GAMBIT database. If **gambit\_info.txt** file is missing, GAMBIT Explorer will attempt to login using your email and organization.



If **guest\_info.txt** and **gambit\_info.txt** are both missing or their content is empty, a Java exception error is generated:

*No local user/guest credentials could be found for GambitExplorer\_UserApp*

### 3. Attempt starting GAMBIT-X:

Windows: navigate to GAMBIT-X home folder and use **start\_gambitx\_userapp.bat** file

Linux, MacOS: navigate to GAMBIT-X home folder and use **start\_gambitx\_userapp.sh** file

**IMPORTANT: Linux, MacOS: use command terminal window, not the file manager**



On Linux and MacOS platforms, raising the executing permission bits may be required for the **start\_gambitx\_userapp.sh** file. Use chmod +x command, e.g.,

```
>sudo chmod +x start_gambitx_userapp.sh
```

Watch for error messages in the GAMBIT-X terminal window as the application starts.



At the startup, GAMBIT Explorer acquires user authentication and content updates from NASA and Lowell GIRO Data Center. This information is acquired over HTTPS connection to various servers at NASA and lgdc.uml.edu server at UML. You may see errors at the startup that refer to the problem with security certificate for these connections. Please refer to Appendix B.



During the startup, “SEVERE Retrieval returned no content” errors may be displayed. The errors are caused not by an SSL certificate issue, but missing pages on NASA WorldWind server. These error messages can be safely ignored.



Please contact [Ivan\\_Galkin@uml.edu](mailto:Ivan_Galkin@uml.edu) for troubleshooting and further instructions if GAMBIT X fails to start at this point.

### 4. Create a desktop shortcut to GAMBIT-X if needed (See Appendix C).

## Appendix A. Linux/MacOS configuration of hardware rendering

Additional configuration steps may be needed for Linux and MacOS platforms to enable required 3D hardware rendering in OpenGL.

- 1) Update display adapter driver to the latest version. Use `/usr/sbin/hwinfo --gfxcard` to determine the graphics card model.
- 2) Verify that OpenGL is installed and operational using `glxgears`.
- 3) Verify that *direct rendering* is enabled in OpenGL using `glxinfo`.
- 4) If direct rendering still remains disabled, editing `xorg.conf` file may be helpful. Add DRI section with permission 0666.

```
Section "DRI"
    Mode 0666
EndSection
```

**For Mac OS High Sierra 10.13 and newer**, the following error can be observed:

```
Apple AWT Internal Exception: NSWindow drag regions should only
be invalidated on the Main Thread!
```

This points to a recent decision by Apple to discontinue support of OpenGL in their latest OSX releases. Consider the following options:

- Follow the following instructions to attempt restoring OpenGL on your latest Mac:  
<https://www.alora.io/forums/topic/28972-how-to-get-hd-opengl-working-on-mac-osx-high-sierra-mojave/>
- Add an older Java virtual machine version and modify GX starting script to use it instead of the latest one. Please refer to Appendix B item 2) for instructions how to use recent NASA and LGDC certificates with the older java machine releases. You will still observe the warning about NSWindow/OpenGL, but at least GAMBIT Explorer will work.

## Appendix B. Linux/MacOS configuration of Java trusted keystore

GAMBIT Explorer may generate error messages during its startup or during its execution with complaints about **missing or expired SSL certificates / wrong certification path / java.security exception**.

For example:

```
*** ERROR LGDC user authentication service is inaccessible
Unexpected error: java.security.InvalidAlgorithmParameterException:
the trustAnchors parameter must be non-empty
```

or

```
javax.net.ssl.SSLHandshakeException:
sun.security.validator.ValidatorException: PKIX path building failed:
sun.security.provider.certpath.SunCertPathBuilderException: unable
to find valid certification path to requested target
```

Background: at the startup, GAMBIT Explorer acquires user authentication and content updates from NASA and Lowell GIRO Data Center. The information is acquired over HTTPS connection to various servers at NASA and lgdc.uml.edu server at UML. These HTTPS connections require security “certificates” to establish trusted connection via a “handshake”. GAMBIT Explorer looks up the certificates in the **local Java store** of trusted certificate authorities. Either NASA or LGDC certificate may be missing in your local Java trusted store. There are two SSL certificates that GAMBIT Explorer needs in order to operate:

- DST Root CA X3 certificate (for NASA)
- USERTrust RSA Certification Authority (for LGDC)

On Ubuntu, the following command rebuilds the certificates:

```
>update-ca-certificates -f
```

On Mac and other Linux releases, Java update or reinstall may be the easiest way to refresh the certificates. Please verify that GAMBIT Explorer starts with the latest java machine (and not with an old one still in the system). Possible options to remedy the outdated Java installation still interfering:

- 1) Start GX with specific (latest) Java machine by modifying the starter script to point to the right location of java binaries
- 2) Point GX to the latest trusted store in the OS (rather than java), for example:

```
java -Djavax.net.ssl.trustStore="/Library/Internet Plug-Ins/JavaAppletPlugin.plugin/Contents/Home/lib/security/cacerts" -
Djavax.net.ssl.trustStorePassword=changeit -Djava.library.path=lib/ -classpath lib/jogl-all.jar:lib/gluegen-
rt.jar:lib/gdal.jar:lib/worldwind.jar:lib/worldwindx.jar:lib/worldwind-2.0.0-https-patch.jar:lib/epsgraphics.jar:lib/jaybird-full-
2.2.5.jar:lib/Jama-1.0.1.jar:lib/jhdf5.jar:lib/jhdf.jar:lib/jhdfobj.jar:lib/commons-io-
2.4.jar:lib/jckit.jar:lib/javax.mail.jar:lib/mysql-connector-java-8.0.15.jar:lib/commons-dbcp2-2.7.0.jar:lib/commons-logging-
1.2.jar:lib/commons-pool2-2.8.0.jar:lib/ini4j-0.5.4.jar:GAMBIT_UserApp.jar edu.uml.giro.gambit.apps.GambitUserApp -sd:/sd
```

- 3) In case you have both JDK and JRE installed, GAMBIT Explorer may be looking into the older JDK rather than newer JRE. Updating JDK should help.

## Appendix C. Creating a desktop icon for GAMBIT launcher

Windows: in File Explorer, right-click on the starter bat file to create the shortcut and move it to Desktop. Rename the shortcut to GAMBIT-X and change icon image to GXicon.ico (in Properties tab) if needed.

Linux: Place a new GAMBIT-X.desktop file to your ~/Desktop folder

```
[Desktop Entry]
Name=GAMBIT X
Comment=GAMBIT Explorer UserApp
Exec=/path-to-home/GAMBIT/start_gambitx_userapp.sh
Icon=/path-to-home/GAMBIT/GXicon.ico
Terminal=true
Type=Application
```