

## University Application Help File

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The university application uses the middleware to communicate between a client and server. The middleware allows for clients to invoke methods on remote objects that are contained on the server in the application. The usiniversity application demonstrates the functionality of the middleware that was created.

### Compiling the Application

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All of the .class and .java files are located in the folder:

```
\RMIPProject\nathan\middleware
```

To compile all of the files:

first change the directory to RMIPProject then:

```
javac nathan/middleware/*.java
```

It is also possible to compile the stub and skeletons for a class. To generate the stub and skeleton execute the following command:

```
java nathan/middleware/StubSkeletonGenerator [Class name] [interface of class]
```

To compile the stubs and skeletons required for the program:

```
java nathan/middleware/StubSkeletonGenerator  
    nathan.middleware.StudentListImpl nathan.middleware.StudentList
```

On a windows system it may be necessary to move the compiled stub and skeleton to the correct directory after they have been compiled, if these files already exist.

### Running the Application

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The first thing that should be done is to start the registry. The registry is start by supplying the command line argument the port number. To start the registry the command below should be issued.

```
java nathan/middleware/Registry [PortNumber]
```

After the registry is started the next thing to do is to start the front end of the active replication manager. If fault tolerance is not desired this step can be skipped. To start the front end the command below should be issued. The name of the replicated object is the name that will be used to locate a remote object by in the registry. The registry port and IP address are used to make a connection to the registry and the front end port is the port that the front end will run on.

```
java nathan/middleware/FrontEnd  
    [Name of Replicated Object] [IP Address] [Registry Port] [Front End Port]
```

Once the front end has been started it is now necessary to start the servers of the remote objects. In the case that the front end is start the user may start multiple servers for an object. To start the server the following command should be issued. The server port is the port number that the server will run on.

```
java nathan/middleware/Server  
    [Name of Object] [Registry IP] [Registry Port] [Server Port]
```

After these three components have been started all that is left to do is to start

the client application. The client application can be started by enter the following command.

```
java nathan/middleware/Client [Name of Object] [Registry IP] [Registry Port]
```

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Documentation  
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All of the code was completely documented. A Java Doc for all of the classes in the project is contained in the folder RMIProject/doc. To access the documentation select the index.html file in the Doc folder.

The Java Doc contains all of the classes need for the middleware and the available methods of all of the classes. The Java Doc also gives instruction on how to run the components needed for the application to function.