CS 442 - Systems Programming
Programming Assignment One

Student: Michelle Miller

Due: April 10th, 2017

Introduction:

This programming assignment required us to create a simple whois client to be used in the command line. I chose to use Java to create this program, since I had used this language before for a similar assignment and knew that it was easy to compile Java programs in the Windows command line.

The program is very simple. All it does is read user input (or arguments, if specified) and determine what type of query is being made. After doing so, it connects to the appropriate WHOIS Server and requests information on the query. Then in prints out the results and closes connections to the WHOIS Server.

High-Level Structure

Program Steps:

Step 1: Determine if user specified arguments
- If yes, use the first argument as the query for the WHOIS server
- If no, prompt user for query

Step 2: Determine the query type and set the following:
- Query type
- WHOIS Server
- Query string

Step 3: Print all settings into console

Step 4: Query specified WHOIS Server with correct settings

Step 5: Confirm completed WHOIS query and print settings again

Checking Format:

When determining the type of query (Step 2), the program first checks if the input string was a valid IPv4 Address by calling a method validIP(String ip) that returns a boolean value. This method uses java.util.regex Pattern and Matcher to determine if the string matches the format of an IPv4 Address.

If the format is not an IPv4 Address, the program will check the end of the string for ".edu", ".com", or ".net".

If the input string matches none of the above, the program will run the string with the WHOIS Server set as DEFAULT_HOST.

Query Settings:

Query Type	**WHOIS Server**	**Query String**
IPv4 Address	whois.arin.net	“n query”
.EDU Domain	whois.educause.edu	“query”
.COM Domain*	whois.internic.net	“domain=query”
.NET Domain	whois.internic.net	“domain=query”
Other	whois.internic.net	“query”

* .COM WHOIS Server switched to whois.internic.net whois.networksolutions.com was not working properly.

Installation and Use

Installation Instructions:

Step 1. Ensure that the Java Virtual Machine is installed on your machine

```
C:\>java -version
java version "1.8.0_121"
Java(TM) SE Runtime Environment (build 1.8.0_121-b13)
Java HotSpot(TM) 64-Bit Server VM (build 25.121-b13, mixed mode)
```

- ➔ Version should be at least “1.8.0_121"
- ➔ If JVM is not installed, go to https://java.com/en/download/

Step 2. Download WhoIsClient.class

Step 3. Move to directory with WhoIsClient.class

```
C:\>cd C:\Users\Student\Documents
```

Step 4. Follow usage instructions below

Usage Instructions:

Type “java WhoIsClient" and enter your query when prompted:

```
C:\Users\Student\Documents>java WhoIsClient
No arguments specified.
Please enter your WHOIS query now:
uwstout.edu
```

Alternatively, you can specify your query as an argument:

```
C:\Users\Student\Documents>java WhoIsClient uwstout.edu
```

Sample Output

Query IPv4 Address:

Command:

```
C:\Users\Student\Documents>java WhoIsClient 144.13.17.20
```

Output Highligh:

```
# The following results may also be obtained via:
# https://whois.arin.net/rest/nets;q=144.13.17.20?showDetails=true&show
TopLevelNet=false&ext=netref2
#

NetRange:       144.13.0.0 - 144.13.255.255
CIDR:           144.13.0.0/16
NetName:        UWSTOUT-NET
NetHandle:      NET-144-13-0-0-1
Parent:         NET144 (NET-144-0-0-0-0)
NetType:        Direct Assignment
OriginAS:
Organization:   University of Wisconsin - Stout (UWS-1)
RegDate:        1990-11-06
Updated:        2009-03-23
Ref:            https://whois.arin.net/rest/net/NET-144-13-0-0-1


OrgName:        University of Wisconsin - Stout
OrgId:          UWS-1
Address:        Administration Building 18
City:           Menomonie
StateProv:      WI
PostalCode:     54751
Country:        US
RegDate:        1990-11-06
Updated:        2017-01-28
Ref:            https://whois.arin.net/rest/org/UWS-1


OrgTechHandle: DW318-ARIN
OrgTechName:   Wahl, Douglas
OrgTechPhone:  +1-715-232-2671
```

Query .EDU Domain:

Command:

```
C:\Users\Student\Documents>java WhoIsClient uwstout.edu
```

Output Highlight:

```
solicitations via e-mail.  The use of electronic processes to
harvest information from this server is generally prohibited
except as reasonably necessary to register or modify .edu
domain names.

You may use "%" as a wildcard in your search. For further
information regarding the use of this WHOIS server, please
type: help

--------------------------

Domain Name: UWSTOUT.EDU

Registrant:
   University of Wisconsin-Stout
   121 10th Avenue
   Menomonie, WI 54751
   UNITED STATES

Administrative Contact:
   Dan Dunbar
   Director Telecom & Networking
   University of Wisconsin-Stout
   Millennium Hall 301
   121 10th Ave
   Menomonie, WI 54751
   UNITED STATES
   (715) 232-5288
   dunbard@uwstout.edu

Technical Contact:
   Michael Dodor
   University of Wisconsin - Stout
   Millennium Hall 105b
   121 10th Ave
   Menomonie, WI 54751
   UNITED STATES
   (715) 232-2671
```

Query .COM Domain:

Command:

```
:\Users\Student\Documents>java WhoIsClient pangoli.com
```

Output:

```
domain=pangoli.com
Query Type: .COM DOMAIN
WHOIS Query for 'pangoli.com' at whois.internic.net:43

Whois Server Version 2.0

Domain names in the .com and .net domains can now be registered
with many different competing registrars. Go to http://www.internic.net
for detailed information.

   Domain Name: PANGOLI.COM
   Registrar: FASTDOMAIN, INC.
   Sponsoring Registrar IANA ID: 1154
   Whois Server: whois.fastdomain.com
   Referral URL: http://www.fastdomain.com
   Name Server: NS1.BLUEHOST.COM
   Name Server: NS2.BLUEHOST.COM
   Status: clientTransferProhibited https://icann.org/epp#clientTransferProhibited
   Updated Date: 21-mar-2017
   Creation Date: 21-mar-2017
   Expiration Date: 21-mar-2018

>>> Last update of whois database: Mon, 10 Apr 2017 21:30:30 GMT <<<

For more information on Whois status codes, please visit https://icann.org/epp

NOTICE: The expiration date displayed in this record is the date the
registrar's sponsorship of the domain name registration in the registry is
currently set to expire. This date does not necessarily reflect the expiration
```

Query .NET Domain:

Command:

```
C:\Users\Student\Documents>java WhoIsClient php.net
```

Output Highlight:

```
C:\Users\Student\Documents>java WhoIsClient php.net
Query Type: .NET DOMAIN
WHOIS Query for 'php.net' at whois.internic.net:43

Whois Server Version 2.0

Domain names in the .com and .net domains can now be registered
with many different competing registrars. Go to http://www.internic.net
for detailed information.

   Domain Name: PHP.NET
   Registrar: TUCOWS DOMAINS INC.
   Sponsoring Registrar IANA ID: 69
   Whois Server: whois.tucows.com
   Referral URL: http://www.tucowsdomains.com
   Name Server: DNS1.EASYDNS.COM
   Name Server: DNS2.EASYDNS.NET
   Name Server: DNS3.EASYDNS.ORG
   Name Server: DNS4.EASYDNS.INFO
   Status: clientTransferProhibited https://icann.org/epp#clientTransferProhibited
   Status: clientUpdateProhibited https://icann.org/epp#clientUpdateProhibited
   Updated Date: 08-aug-2015
   Creation Date: 18-nov-1997
   Expiration Date: 17-nov-2023

>>> Last update of whois database: Mon, 10 Apr 2017 21:29:14 GMT <<<

For more information on Whois status codes, please visit https://icann.org/epp
```

Other queries:

Command:

```
C:\Users\Student\Documents>java WhoIsClient example
```

Output Highlight:

```
C:\Users\Student\Documents>java WhoIsClient example
Query Type: UNKNOWN
WHOIS Query for 'example' at whois.internic.net:43

Whois Server Version 2.0

Domain names in the .com and .net domains can now be registered
with many different competing registrars. Go to http://www.internic.net
for detailed information.

Aborting search 50 records found .....
EXAMPLE-1.COM
EXAMPLE-1.NET
EXAMPLE-2.COM
EXAMPLE-AD.COM
EXAMPLE-AGENCY.COM
EXAMPLE-AGENT-DOMAIN.COM
EXAMPLE-ALTERNATIVE.NET
EXAMPLE-ANIMALERIE.COM
EXAMPLE-API.COM
EXAMPLE-AUTHOR.COM
EXAMPLE-BANK.COM
EXAMPLE-BATTLE.COM
EXAMPLE-BELIEVE.COM
EXAMPLE-BLOG.COM
EXAMPLE-BROKERAGE.COM
EXAMPLE-BUILD.NET
```

Lessons Learned:

1. Compiling Java files in Command Line
    - ➔ I knew how to do this, but forgot
    - ➔ After installing JDK, you have to add the path to the environment variable
2. Using Sockets in Java to connect to server
    - ➔ I've used sockets before in CEE 425, but not for connecting to remote servers
    - ➔ It was pretty much the same thing
3. Making queries to servers and getting results
    - ➔ This will be really useful with my capstone project
    - ➔ I assumed this would be much harder
4. Reading arguments in Java
    - ➔ I forgot how to do this and initially ended up throwing exceptions
5. Pattern and Matcher in Java
    - ➔ I never knew about either of these
    - ➔ This can make a lot of applications easier by simplifying validation of user input

Conclusion:

For this assignment, I chose Java as my programming language because I knew it would be easy to program in Notepad++ and compile in the Windows Command Line. I wanted to focus on the program itself, rather than getting setup to program in the first place.

This assignment covered some essential topics. For many of my projects (personal and school-related), I need to know how to create a connection to a server and make queries. This project, though simple, covered the basics so I know where to begin with my other projects.