

```

1:  /*
2:  * @author Haniel Rameshbabu
3:  */
4:
5:  package cs3524.solutions.mud;
6:
7:  import java.rmi.Naming;
8:  import java.lang.SecurityManager;
9:  import java.rmi.server.UnicastRemoteObject;
10: import java.util.List;
11: import java.util.Scanner;
12:
13: public class Client {
14:
15:     public static void main(String args[]) {
16:         if (args.length < 3) {
17:             System.err.println( "Usage:\njava Client <registryhostname
> <registryport> <callbackport>" );
18:             return;
19:         }
20:
21:         try {
22:
23:             String hostname = args[0];
24:             int registryport = Integer.parseInt( args[1] );
25:             int callbackport = Integer.parseInt( args[2] );
26:
27:             System.setProperty( "java.security.policy", "mud.policy" );
28:
29:             System.setSecurityManager( new SecurityManager() );
30:
31:             // User Instance
32:             String userName = System.console().readLine("Username: ").
trim();
33:             UserImpl user = new UserImpl( userName );
34:             t.exportObject( user, callbackport );
35:
36:             // Stub
37:             String regURL = "rmi://" + hostname + ":" + registryport +
"/MUDServer";
38:             System.out.println("Looking up " + regURL );
39:             MUDServerInterface serverstub = (MUDServerInterface)Naming
.lookup( regURL );
40:
41:
42:             List<String> servers = serverstub.listServers();
43:             Integer i = 1;
44:             for( String srv : servers )
45:             {
46:                 System.out.println("(" + i + ") " + srv);
47:                 ++i;
48:             }
49:
50:             //choose a server or create your own
51:             String chosenServerString = null;
52:             boolean response = false;
53:             while(chosenServerString == null)
54:             {
55:                 chosenServerString = System.console().readLine("Co
nnect to server number: ").trim();
56:                 if (Integer.parseInt(chosenServerString) <= server
s.size())
57:                 {
58:                     // you have chosen one of the existing ser
vers
59:                     Integer chosenServerInt = Integer.parseInt

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(chosenServerString);
60:
61:         lue to match index
62:         et(chosenServerInt), userstub);
63:         if ( response == false ){System.exit(0);}
64:         }
65:         else { // invalid input
66:             chosenServerString = null;
67:             System.out.println("Invalid choice! Try ag
ain.");
68:         }
69:
70:         // Main interface
71:         System.out.println( "Type 'help' for controls/commands" );
72:         String input;
73:         while (true) {
74:             input = System.console().readLine("\nEnter command
:\n\n").trim();
75:
76:             // Basic commands sys out
77:             if ( input.equals("help") ) {
78:                 System.out.println( "\nview \nmove \ntake
\nshow inventory \nonline users \nmessage \nexit\n" );
79:             }
80:
81:             else if ( input.equals( "view" ) )
82:             {
83:                 //view waht you have around you
84:                 serverstub.view( userName, "paths" );
85:                 serverstub.view( userName, "things" );
86:             }
87:
88:             else if ( input.equals( "move" ) )
89:             {
90:                 // move somewhere
91:                 System.out.println( "You can move:\n" );
92:                 serverstub.view( userName, "paths" );
93:                 input = System.console().readLine( "Where
do you want to move?\n" ).trim();
94:                 if ( input.equals("north") || input.equals
("east") || input.equals("south") || input.equals("west") )
95:                 {
96:                     serverstub.moveUser( userName, inp
ut );
97:                 }
98:             }
99:
100:             else if ( input.equals( "take" ) )
101:             {
102:                 // take item around you
103:                 serverstub.view( userName, "things" );
104:                 input = System.console().readLine( "What w
ould you like to take?\n" ).trim();
105:                 serverstub.getThing( userName, input );
106:             }
107:
108:             else if ( input.equals( "show inventory" ) )
109:             {
110:                 //show your items in inventory
111:                 serverstub.showInventory( userName );
112:             }
113:
114:             else if ( input.equals( "online users" ) )
115:             {
116:                 // show all online users on the server
117:                 serverstub.listUsers( userName );
118:             }
119:
120:             else if ( input.equals( "message" ) )

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116:                {           // send a message to online user
117:                System.out.println( "You can message to:\n
" );
118:                serverstub.listUsers( userName );
119:                String to = System.console().readLine( "Write the name:\n" ).trim();
120:                String message = System.console().readLine( "Write the message:\n" ).trim();
121:                serverstub.message(userName, to, message )
;
122:                }
123:
124:
125:
126:                // Exit
127:                else if ( input.equals( "exit" ) ) {
128:                //serverStub.leaveServer( userName );
129:                System.exit(0);
130:                }
131:
132:                // Invalid command
133:                else {
134:                System.out.println("Please enter valid command.\n");
135:                }
136:        }
137:
138:    }
139:    catch(java.rmi.NotBoundException e) {
140:        //System.err.println( "Can't find the auctioneer in the registry." );
141:        System.err.println( "Error: server NotBoundException" );
142:    }
143:    catch (java.io.IOException e) {
144:        System.out.println( "Failed to register." );
145:    }
146:    }
147:
148:
149: }
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1: /*****
2:  * cs3524.solutions.mud.Edge
3:  *****/
4:
5: package cs3524.solutions.mud;
6:
7: // Represents an path in the MUD (an edge in a graph).
8: class Edge
9: {
10:     public Vertex _dest;    // Your destination if you walk down this path
11:     public String _view;    // What you see if you look down this path
12:
13:     public Edge( Vertex d, String v )
14:     {
15:         _dest = d;
16:         _view = v;
17:     }
18: }
19:
```

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1: /*****
2:  * cs3524.solutions.mud.MUD
3:  *****/
4:
5: package cs3524.solutions.mud;
6:
7: import java.io.FileReader;
8: import java.io.BufferedReader;
9: import java.io.IOException;
10: import java.util.StringTokenizer;
11:
12: import java.util.Iterator;
13: import java.util.List;
14: import java.util.Map;
15: import java.util.Vector;
16: import java.util.HashMap;
17:
18: /**
19:  * A class that can be used to represent a MUD; essentially, this is a
20:  * graph.
21:  */
22:
23: public class MUD
24: {
25:     /**
26:      * Private stuff
27:      */
28:
29:     // A record of all the vertices in the MUD graph. HashMaps are not
30:     // synchronized, but we don't really need this to be synchronised.
31:     private Map<String,Vertex> vertexMap = new HashMap<String,Vertex>();
32:
33:     private String _startLocation = "";
34:
35:     /**
36:      * Add a new edge to the graph.
37:      */
38:     private void addEdge( String sourceName,
39:                          String destName,
40:                          String direction,
41:                          String view )
42:     {
43:         Vertex v = getOrCreateVertex( sourceName );
44:         Vertex w = getOrCreateVertex( destName );
45:         v._routes.put( direction, new Edge( w, view ) );
46:     }
47:
48:     /**
49:      * Create a new thing at a location.
50:      */
51:     private void createThing( String loc,
52:                              String thing )
53:     {
54:         Vertex v = getOrCreateVertex( loc );
55:         v._things.add( thing );
56:     }
57:
58:     /**
59:      * Change the message associated with a location.
60:      */
61:     private void changeMessage( String loc, String msg )
62:     {
63:         Vertex v = getOrCreateVertex( loc );
64:         v._msg = msg;
65:     }
66:
67:     /**

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68:      * If vertexName is not present, add it to vertexMap. In either
69:      * case, return the Vertex. Used only for creating the MUD.
70:      */
71:     private Vertex getOrCreateVertex( String vertexName )
72:     {
73:         Vertex v = vertexMap.get( vertexName );
74:         if ( v == null ) {
75:             v = new Vertex( vertexName );
76:             vertexMap.put( vertexName, v );
77:         }
78:         return v;
79:     }
80:
81:     /**
82:      *
83:      */
84:     private Vertex getVertex( String vertexName )
85:     {
86:         return vertexMap.get( vertexName );
87:     }
88:
89:     /**
90:      * Creates the edges of the graph on the basis of a file with the
91:      * following format:
92:      * source direction destination message
93:      */
94:     private void createEdges( String edgesfile )
95:     {
96:         try {
97:             FileReader fin = new FileReader( edgesfile );
98:             BufferedReader edges = new BufferedReader( fin );
99:             String line;
100:             while( (line = edges.readLine()) != null ) {
101:                 StringTokenizer st = new StringTokenizer( line );
102:                 if( st.countTokens() < 3 ) {
103:                     System.err.println( "Skipping ill-formatted line " + line );
104:                     continue;
105:                 }
106:                 String source = st.nextToken();
107:                 String dir = st.nextToken();
108:                 String dest = st.nextToken();
109:                 String msg = "";
110:                 while (st.hasMoreTokens()) {
111:                     msg = msg + st.nextToken() + " ";
112:                 }
113:                 addEdge( source, dest, dir, msg );
114:             }
115:         }
116:         catch( IOException e ) {
117:             System.err.println( "Graph.createEdges( String " +
118:                                edgesfile + ")\n" + e.getMessage() );
119:         }
120:     }
121:
122:     /**
123:      * Records the messages associated with vertices in the graph on
124:      * the basis of a file with the following format:
125:      * location message
126:      * The first location is assumed to be the starting point for
127:      * users joining the MUD.
128:      */
129:     private void recordMessages( String messagesfile )
130:     {
131:         try {
132:             FileReader fin = new FileReader( messagesfile );
133:             BufferedReader messages = new BufferedReader( fin );
134:             String line;

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135:     boolean first = true; // For recording the start location.
136:     while((line = messages.readLine()) != null) {
137:         StringTokenizer st = new StringTokenizer( line );
138:         if( st.countTokens( ) < 2 ) {
139:             System.err.println( "Skipping ill-formatted line " + line );
140:             continue;
141:         }
142:         String loc = st.nextToken();
143:         String msg = "";
144:         while (st.hasMoreTokens()) {
145:             msg = msg + st.nextToken() + " ";
146:         }
147:         changeMessage( loc, msg );
148:         if( first ) { // Record the start location.
149:             _startLocation = loc;
150:             first = false;
151:         }
152:     }
153: }
154: catch( IOException e ) {
155:     System.err.println( "Graph.recordMessages( String " +
156:         messagesfile + ")\n" + e.getMessage() );
157: }
158: }
159:
160: /**
161:  * Records the things associated with vertices in the graph on
162:  * the basis of a file with the following format:
163:  * location thing1 thing2 ...
164:  */
165: private void recordThings( String thingsfile )
166: {
167:     try {
168:         FileReader fin = new FileReader( thingsfile );
169:         BufferedReader things = new BufferedReader( fin );
170:         String line;
171:         while((line = things.readLine()) != null) {
172:             StringTokenizer st = new StringTokenizer( line );
173:             if( st.countTokens( ) < 2 ) {
174:                 System.err.println( "Skipping ill-formatted line " + line );
175:                 continue;
176:             }
177:             String loc = st.nextToken();
178:             while (st.hasMoreTokens()) {
179:                 addThing( loc, st.nextToken());
180:             }
181:         }
182:     }
183:     catch( IOException e ) {
184:         System.err.println( "Graph.recordThings( String " +
185:             thingsfile + ")\n" + e.getMessage() );
186:     }
187: }
188:
189: /**
190:  * All the public stuff. These methods are designed to hide the
191:  * internal structure of the MUD. Could declare these on an
192:  * interface and have external objects interact with the MUD via
193:  * the interface.
194:  */
195:
196: /**
197:  * A constructor that creates the MUD.
198:  */
199: public MUD( String edgesfile, String messagesfile, String thingsfile )
200: {
201:     createEdges( edgesfile );

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202:     recordMessages( messagesfile );
203:     recordThings( thingsfile );
204:
205:     System.out.println( "Files read..." );
206:     System.out.println( vertexMap.size( ) + " vertices\n" );
207: }
208:
209: // This method enables us to display the entire MUD (mostly used
210: // for testing purposes so that we can check that the structure
211: // defined has been successfully parsed.
212: public String toString()
213: {
214:     String summary = "";
215:     Iterator iter = vertexMap.keySet().iterator();
216:     String loc;
217:     while (iter.hasNext()) {
218:         loc = (String)iter.next();
219:         summary = summary + "Node: " + loc;
220:         summary += ((Vertex)vertexMap.get( loc )).toString();
221:     }
222:     summary += "Start location = " + _startLocation;
223:     return summary;
224: }
225:
226: /**
227:  * A method to provide a string describing a particular location.
228:  */
229: public String locationInfo( String loc )
230: {
231:     return getVertex( loc ).toString();
232: }
233:
234: /**
235:  * Get the start location for new MUD users.
236:  */
237: public String startLocation()
238: {
239:     return _startLocation;
240: }
241:
242: /**
243:  * method that provides info where a player can move
244:  */
245: public String locationPaths( String loc )
246: {
247:     String message = getVertex( loc )._msg + "\n";
248:     for (Map.Entry<String, Edge> vertex : getVertex(loc)._routes.entrySet())
249:     {
250:         message += "You can move to the " + vertex.getKey() + " there is " + v
251:             ertex.getValue()._view + "\n";
252:     }
253:     return message;
254: }
255:
256: //method that provides info about things on location
257: public List locationThings( String loc )
258: {
259:     List<String> things = getVertex(loc)._things;
260:     return things;
261: }
262:
263: /**
264:  * Add a thing to a location; used to enable us to add new users.
265:  */
266: public void addThing( String loc,
267:     String thing )

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268:     {
269:         Vertex v = getVertex( loc );
270:         v._things.add( thing );
271:     }
272:
273:     /**
274:      * Remove a thing from a location.
275:      */
276:     public void delThing( String loc,
277:                          String thing )
278:     {
279:         Vertex v = getVertex( loc );
280:         v._things.remove( thing );
281:     }
282:
283:     /**
284:      * A method to enable a player to move through the MUD (a player
285:      * is a thing). Checks that there is a route to travel on. Returns
286:      * the location moved to.
287:      */
288:     public String moveThing( String loc, String dir, String thing )
289:     {
290:         Vertex v = getVertex( loc );
291:         Edge e = v._routes.get( dir );
292:         if (e == null)    // if there is no route in that direction
293:             return loc;  // no move is made; return current location.
294:         v._things.remove( thing );
295:         e._dest._things.add( thing );
296:         return e._dest._name;
297:     }
298:
299:     /**
300:      * A main method that can be used to testing purposes to ensure
301:      * that the MUD is specified correctly.
302:      */
303:     public static void main(String[] args)
304:     {
305:         if (args.length != 3) {
306:             System.err.println("Usage: java Graph <edgesfile> <messagesfile> <thin
gsfile>");
307:             return;
308:         }
309:         MUD m = new MUD( args[0], args[1], args[2] );
310:         System.out.println( m.toString() );
311:     }
312: }
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1:  /*
2:  * @author Haniel Rameshbabu
3:  * Implementation of MUDServerInterface
4:  */
5:
6:  package cs3524.solutions.mud;
7:
8:  import java.rmi.Remote;
9:  import java.rmi.RemoteException;
10: import java.util.Iterator;
11: import java.util.List;
12: import java.util.Map;
13: import java.util.ArrayList;
14: import java.util.Set;
15: import java.util.HashMap;
16:
17:
18: public class MUDServerImpl implements MUDServerInterface {
19:
20:     // Key => Value; name => MUD object
21:     private Map<String, MUD> servers = new HashMap<String, MUD>();
22:
23:     // whereabouts of the User
24:     private Map<String, String> userMap = new HashMap<String, String>();
25:     // records of all users positions
26:     private Map<String, String> userPosMap = new HashMap<String, String>();
27:
28:     // server => Hash of all usernames logged
29:     private Map<String, HashMap<String, UserInterface>> loggedUsers = new Hash
Map<String, HashMap<String, UserInterface>>();
30:
31:     // holds records of all user inventories
32:     // @format InventpryName => InventoryItem
33:     private Map<String, ArrayList<String>> inventoryMap = new HashMap<String,
ArrayList<String>>();
34:
35:     // Create all servers at start; i.e 3;
36:     public MUDServerImpl() throws RemoteException {
37:         // Server 1 (Rosa)
38:         servers.put("Rosa", new MUD("MUDs/rosa/rosa.edg", "MUDs/rosa/rosa.msg", "MUDs/ro
sa/rosa.thg"));
39:         // Username => Object
40:         HashMap<String, UserInterface> RosaObj = new HashMap<String, UserInterface>();
41:         loggedUsers.put( "Rosa", RosaObj);
42:
43:         // Server 2
44:         servers.put("Tros", new MUD("MUDs/tros/tros.edg", "MUDs/tros/tros.msg", "MUDs/tr
os/tros.thg"));
45:         // Username => Object
46:         HashMap<String, UserInterface> TrosObj = new HashMap<String, UserInterface>();
47:         loggedUsers.put( "Tros", TrosObj);
48:
49:         // Server 3
50:         servers.put("Gina", new MUD("MUDs/gina/gina.edg", "MUDs/gina/gina.msg", "MUDs/gi
na/gina.thg"));
51:         // Username => Object
52:         HashMap<String, UserInterface> GinaObj = new HashMap<String, UserInterface>();
53:         loggedUsers.put( "Gina", GinaObj);
54:
55:     }
56:
57:     public List<String> listServers() throws RemoteException {
58:         Set<String> set = servers.keySet();
59:         return new ArrayList<String>(set);
60:     }
61:
62:     public boolean joinServer(String servername, UserInterface user) throws RemoteEx

```

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ception {
63:         MUD server = servers.get(servername);
64:         String userName = user.getName();
65:         HashMap<String, UserInterface> userObj;
66:
67:
68:         /*if(loggedUsers.get(name).size() >= maxPlayers) { // check if maxPlayers is
reached
69:             client.sendMessage( "Sorry maximum players reached. Try later or join anothe
r server" );
70:             return false;
71:         }
72:
73:         if ( userMap.get( userName ) != null ) { // check if userName already exist
. It must be unique
74:             client.sendMessage( "Change name please! User already exist!" );
75:             return false;
76:         }*/
77:
78:         // User
79:         userMap.put( userName, servername );
80:         userObj = loggedUsers.get( servername );
81:
82:         userObj.put( userName, user);
83:
84:         loggedUsers.put( servername, userObj );
85:
86:         userPosMap.put( userName, server.startLocation() );
87:
88:         inventoryMap.put( userName, new ArrayList<String>() );
89:
90:         server.addThing( server.startLocation(), "User: "+userName );
91:
92:
93:         // prepare the message
94:         String message = ( "\n***** Welcome to " + servername + " Server *****\n" );
95:         message += "Current number of player on this server is "+loggedUsers.get( serv
ername ).size()+"\n";
96:         message += "You are currently at "+userPosMap.get( userName )+" location\n";
97:
98:         // send the message to the client
99:         user.sendMessage( message );
100:         return true;
101:     }
102:
103:     // view what is at particular location
104:     public boolean view( String userName, String what ) throws RemoteException{
105:         String serverName = userMap.get( userName );
106:         MUD server = servers.get( serverName );
107:         HashMap<String, UserInterface> clientsMap = loggedUsers.get( serverName );
108:         UserInterface client = clientsMap.get( userName );
109:         String position = userPosMap.get( userName );
110:         String message = null;
111:
112:         if ( what.equals("paths") )
113:         { // send info about possible paths
114:             message = server.locationPaths( position );
115:             client.sendMessage( message );
116:             return true;
117:         }
118:
119:         if ( what.equals("things") )
120:         { // send info about things
121:             message = "There is:\n";
122:             List<String> things = server.locationThings( position );
123:             for ( String t : things )
124:                 { // construct the message and send

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125:         message += t + "\n";
126:     }
127:     client.sendMessage( message );
128:     return true;
129: }
130: return false;
131: }
132: }
133: public boolean moveUser(String userName, String position) throws RemoteException
134: { // move the user
135:     String serverName = userMap.get( userName );
136:     MUD server = servers.get( serverName );
137:     HashMap<String, UserInterface> clientsMap = loggedUsers.get( serverName );
138:     UserInterface client = clientsMap.get( userName );
139:     String origin = userPosMap.get( userName );
140:     String message = "";
141:     // try to move the user and check response
142:     message = server.moveThing( origin, position, "User: "+userName );
143:     userPosMap.put( userName, message );
144:     if ( message.equals( origin ) )
145:     { // user is at the same place because there is no path
146:         client.sendMessage( "You cannot move there.\n" );
147:         return false;
148:     }
149:     client.sendMessage( "You moved to " + message + "\n" );
150:     return true;
151: }
152:
153:
154:
155: public boolean getThing( String userName, String thing) throws RemoteException
156: { // client can take a thing but not a user
157:
158:     String serverName = userMap.get( userName );
159:     MUD server = servers.get( serverName );
160:     HashMap<String, UserInterface> clientsMap = loggedUsers.get( serverName );
161:     UserInterface client = clientsMap.get( userName );
162:     ArrayList<String> inventory = inventoryMap.get( userName );
163:     List<String> things = server.locationThings( userPosMap.get( userName ) );
164:
165:     for ( String t : things )
166:     { // iterate through things
167:         if ( thing.equals( t ) && !thing.contains("User:") )
168:         { // check if there is the thing client wants to take
169:             // && check of the thing is not user
170:             server.delThing( userPosMap.get( userName ), t );
171:             inventory.add( t );
172:             inventoryMap.put( userName, inventory );
173:             client.sendMessage( "You have: "+inventory.toString() );
174:             return true;
175:         }
176:     }
177:     // the thing was not there or it was a user
178:     client.sendMessage( "No!\nYou have: "+inventory.toString() );
179:     return false;
180: }
181: }
182:
183: public boolean showInventory( String userName ) throws RemoteException
184: { // list all the collected items
185:     String serverName = userMap.get( userName );
186:     MUD server = servers.get( serverName );
187:     HashMap<String, UserInterface> clientsMap = loggedUsers.get( serverName );
188:     UserInterface client = clientsMap.get( userName );
189:     List<String> inventory = inventoryMap.get( userName );
190:     String message = "In your inventory is:\n";
191:     client.sendMessage( message+inventory.toString() );
192:     return true;
193: }
194:
195: public boolean listUsers( String userName ) throws RemoteException
196: { // list all the online users at the server where client is.
197:     String serverName = userMap.get( userName );
198:     MUD server = servers.get( serverName );
199:     HashMap<String, UserInterface> clientsMap = loggedUsers.get( serverName );
200:     UserInterface client = clientsMap.get( userName );
201:     String message = "\nThese users are online:\n";
202:     Set<String> clientsSet = clientsMap.keySet();
203:     for (String c : clientsSet )
204:     {
205:         message += c+"\n";
206:     }
207:     client.sendMessage( message );
208:     return true;
209: }
210:
211: public boolean message( String userName, String to, String message ) throws Remote
212: { // send a message to a user
213:     String serverName = userMap.get( userName );
214:     MUD server = servers.get( serverName );
215:     HashMap<String, UserInterface> clientsMap = loggedUsers.get( serverName );
216:     UserInterface fromClient = clientsMap.get( userName );
217:     UserInterface toClient = clientsMap.get( to );
218:     String formattedMessage = "Message from " + userName + ":\n" + message;
219:     toClient.sendMessage( formattedMessage );
220:     fromClient.sendMessage( "\nMessage sent\n" );
221:     return true;
222: }
223:
224:
225: }
```



```
1: /*
2:  * @author Haniel Rameshbabu
3:  * Remote Interface for MUD game server
4:  */
5:
6: package cs3524.solutions.mud;
7:
8: import java.rmi.Remote;
9: import java.rmi.RemoteException;
10: import java.util.List;
11:
12:
13: public interface MUDServerInterface extends Remote
14: {
15:
16:     public List<String> listServers() throws RemoteException;
17:     public boolean joinServer( String servername, UserInterface user ) throws
RemoteException;
18:     //public boolean leaveServer( String userName ) throws RemoteException;
19:     public boolean view( String userName, String way ) throws RemoteException;
20:     public boolean moveUser( String userName, String position ) throws RemoteE
xception;
21:     public boolean getThing( String userName, String thing ) throws RemoteExce
ption;
22:     public boolean showInventory( String userName ) throws RemoteException;
23:     public boolean listUsers( String userName ) throws RemoteException;
24:     public boolean message( String userName, String to, String message ) throw
s RemoteException;
25: }
```

```
1: /*
2:  * @author Haniel Rameshbabu
3:  * @title Server Mainline for MUD game server
4:  * @source Adapted Practicals 1 code
5:  */
6:
7: package cs3524.solutions.mud;
8:
9: import java.io.InputStreamReader;
10: import java.net.InetAddress;
11: import java.rmi.Naming;
12: import java.rmi.RMISecurityManager;
13: import java.rmi.server.UnicastRemoteObject;
14:
15: public class MUDServerMainline {
16:
17:
18:
19:     public static void main(String args[]){
20:
21:         if (args.length < 2) {
22:             System.err.println("Usage: \njava MUDServerMainline <regis
tryport> <serverport>");
23:             return;
24:         }
25:
26:         try {
27:             String hostname = (InetAddress.getLocalHost()).getCanonica
lHostName();
28:             int registryport = Integer.parseInt(args[0]);
29:             int serverport = Integer.parseInt(args[1]);
30:
31:             // Security Policy
32:             System.setProperty("java.security.policy", "mud.policy");
33:             System.setSecurityManager( new SecurityManager());
34:
35:             // Generate remote Objects
36:             MUDServerImpl server = new MUDServerImpl();
37:             MUDServerInterface stub = (MUDServerInterface)UnicastRemot
eObject.exportObject(server, serverport);
38:
39:             String regURL = "rmi://" + hostname + ":" + registryport +
"/MUDServer";
40:             System.out.println("Registering " + regURL);
41:             Naming.rebind(regURL, stub);
42:
43:         }
44:
45:         // Error Catching
46:         catch(java.net.UnknownHostException e) {
47:             System.err.println( "Cannot determine localhost name." );
48:             System.err.println( e.getMessage() );
49:         }
50:         catch (java.io.IOException e) {
51:             System.err.println( "Failed to register!" );
52:             System.err.println( e.getMessage() );
53:         }
54:
55:     }
56:
57:
58: }
```

```
1: /*
2:  * @author Haniel Rameshbabu
3:  */
4:
5: package cs3524.solutions.mud;
6:
7: //import java.util.List;
8: //import java.util.ArrayList;
9:
10: public class UserImpl implements UserInterface {
11:     private String userName;
12:
13:     public UserImpl( String name ) {
14:         userName = name;
15:     }
16:
17:     public String getName() {
18:         return userName;
19:     }
20:
21:     public void sendMessage(String message) {
22:         System.out.println(message);
23:     }
24: }
```

```

1:  /*
2:  * @author Haniel Rameshbabu
3:  */
4:
5:  package cs3524.solutions.mud;
6:
7:  //import java.util.List;
8:  import java.rmi.Remote;
9:  import java.rmi.RemoteException;
10:
11:  public interface UserInterface extends Remote
12:  {
13:      public String getName() throws RemoteException;
14:      public void sendMessage( String message ) throws RemoteException;
15:
16:  }
  
```

```
1: /*****
2:  * cs3524.solutions.mud.Vertex
3:  *****/
4:
5: package cs3524.solutions.mud;
6:
7: import java.util.Map;
8: import java.util.HashMap;
9: import java.util.List;
10: import java.util.Vector;
11: import java.util.Iterator;
12:
13: // Represents a location in the MUD (a vertex in the graph).
14: class Vertex
15: {
16:     public String _name;           // Vertex name
17:     public String _msg = "";       // Message about this location
18:     public Map<String,Edge> _routes; // Association between direction
19:                                     // (e.g. "north") and a path
20:                                     // (Edge)
21:     public List<String> _things;    // The things (e.g. players) at
22:                                     // this location
23:
24:     public Vertex( String nm )
25:     {
26:         _name = nm;
27:         _routes = new HashMap<String,Edge>(); // Not synchronised
28:         _things = new Vector<String>();       // Synchronised
29:     }
30:
31:     public String toString()
32:     {
33:         String summary = "\n";
34:         summary += _msg + "\n";
35:         Iterator iter = _routes.keySet().iterator();
36:         String direction;
37:         while (iter.hasNext()) {
38:             direction = (String)iter.next();
39:             summary += "To the " + direction + " there is " + ((Edge)_routes.get(
direction))._view + "\n";
40:         }
41:         iter = _things.iterator();
42:         if (iter.hasNext()) {
43:             summary += "You can see: ";
44:             do {
45:                 summary += iter.next() + " ";
46:             } while (iter.hasNext());
47:         }
48:         summary += "\n\n";
49:         return summary;
50:     }
51: }
52:
```