2016

OTEX FRAMEWORK

COMP7722 MAJOR PROJECT, SEMESTER 2 2016

MARK GILLARD (2065050 / GILL0235)

OTEX

AN OT-BASED TEXT EDITOR FRAMEWORK BY MARK GILLARD (2065050 / GILL0235)

CONTENTS

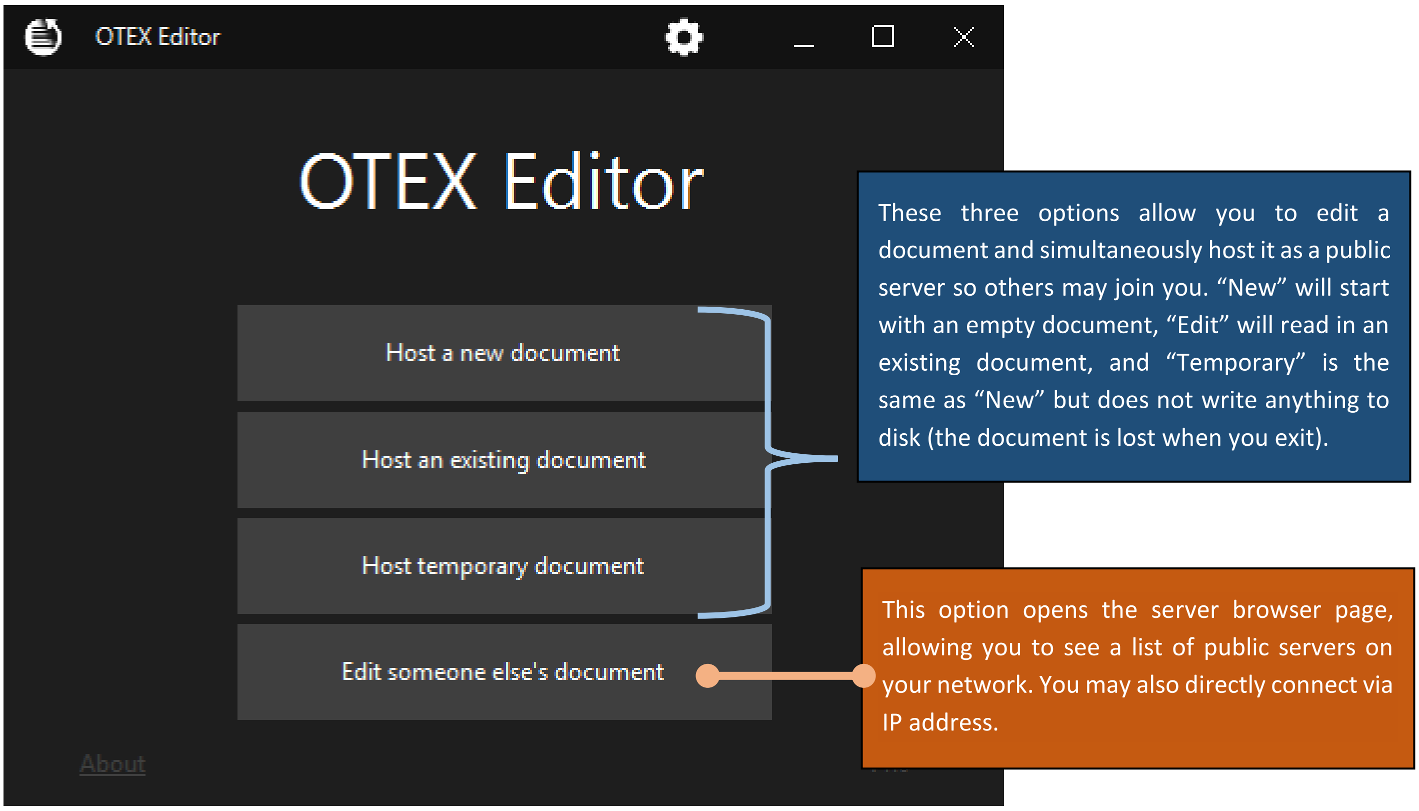
SYSTEM REQUIREMENTS

OTEX requires Windows 7 or higher, with the .NET Framework 4.5.2. Most systems that have not disabled windows updates will have this installed already, but if you need it you can download it here: https://www.microsoft.com/en-au/download/details.aspx?id=42642

LAUNCHING OTEX EDITOR

Run OTEX**x86**\OTEXEditor.exe if your machine is 32-bit, or OTEX**x64**\OTEXEditor.exe if it is 64-bit. If you're going to connect to an external server, you do not need to run the same platform's binary as the server; the communication between clients and servers is platform-agnostic.

Once it's running, you'll see this:



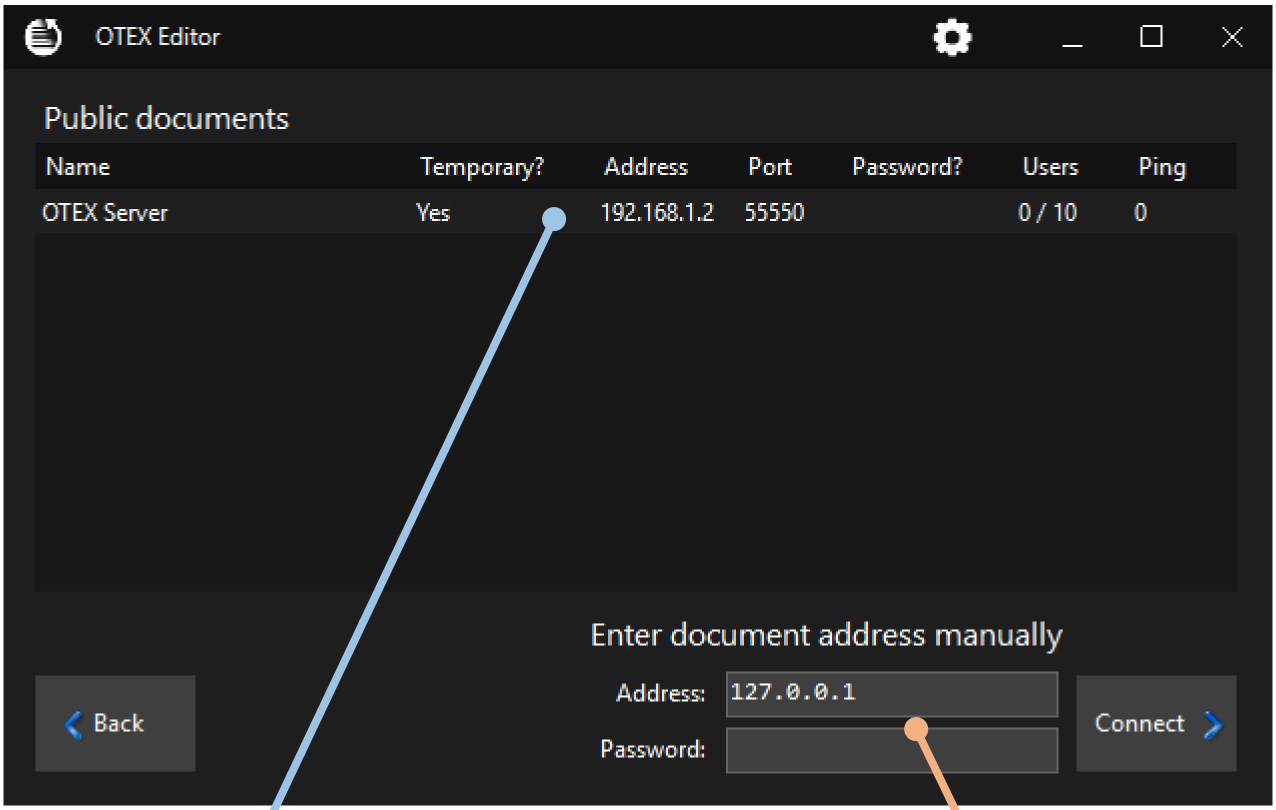
These three options allow you to edit a document and simultaneously host it as a public server so others may join you. "New" will start with an empty document, "Edit" will read in an existing document, and "Temporary" is the same as "New" but does not write anything to disk (the document is lost when you exit).

This option opens the server browser page, allowing you to see a list of public servers on your network. You may also directly connect via IP address.

- Selecting "New" or "Edit" mode will ask you to select a file to create/edit before the editor is launched.
  - **Note #1**: OTEX is a plain-text system, so attempting to force it to load binary files will have undefined results!
  - **Note #2:** OTEX Editor supports a wide variety of text file encodings on input, but writes files out in UTF-8 (without BOM).
  - **Note #3:** OTEX Editor supports three different line ending schemes: LF (unix), CR (?), and CRLF (windows). When files are first read OTEX Editor attempts to determine the scheme in use for the file by counting instances of each. If this fails it will fall back to the environment default (CRLF).
  - **Note #4:** Because of a limitation of the **FastColoredTextBox** control used by OTEX Editor, any tab (\t) characters in input files are replaced by 4 spaces.
- Selecting "Temporary" will launch the editor immediately.
- Selecting "Edit someone else's document" will open the server browser (see next page).

CONNECTING TO AN OTEX SERVER

The OTEX Editor server browser page allows you to connect to OTEX Servers:



Name	Temporary?	Address	Port	Password?	Users	Ping
OTEX Server	Yes	192.168.1.2	55550		0 / 10	0

Address: 127.0.0.1

Password:

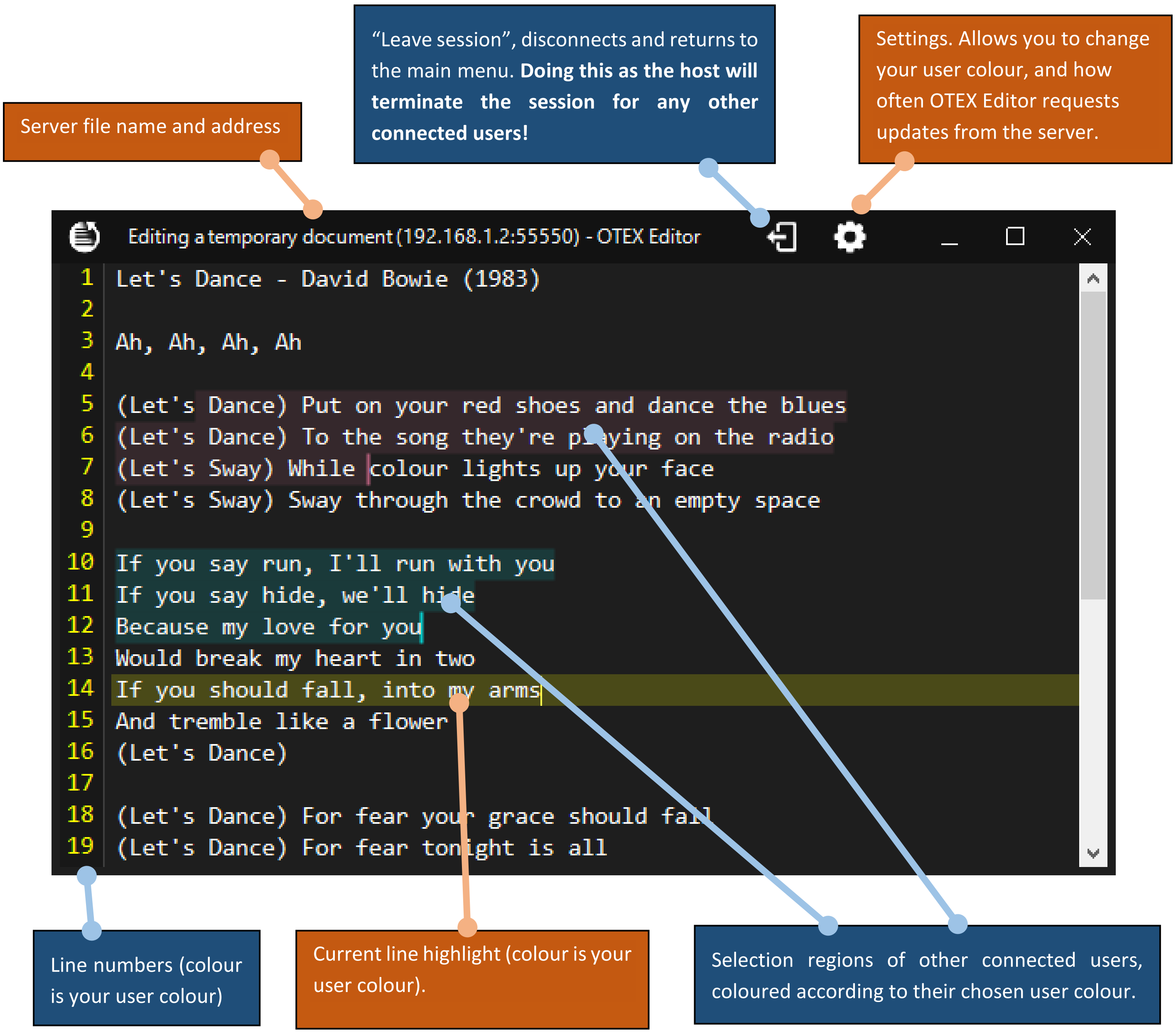
To connect to a public server, simply double-click it. If it requires a password you will be prompted for one.

To directly connect to a known server:

1. Type in the address in the “Address” field. If the server uses a non-standard port, indicate the port at the end of the address using **:00000** notation.
2. Type the server’s password into the Password field. If it does not require one, leave it blank.
3. Click Connect.

EDITING A DOCUMENT

Once connected to a server (or hosting one locally), you will see the editor interface:



Server file name and address

"Leave session", disconnects and returns to the main menu. **Doing this as the host will terminate the session for any other connected users!**

Settings. Allows you to change your user colour, and how often OTEX Editor requests updates from the server.

Editing a temporary document (192.168.1.2:55550) - OTEX Editor

```
Let's Dance - David Bowie (1983)

Ah, Ah, Ah, Ah

(Let's Dance) Put on your red shoes and dance the blues
(Let's Dance) To the song they're playing on the radio
(Let's Sway) While colour lights up your face
(Let's Sway) Sway through the crowd to an empty space

If you say run, I'll run with you
If you say hide, we'll hide
Because my love for you
Would break my heart in two
If you should fall, into my arms
And tremble like a flower
(Let's Dance)

(Let's Dance) For fear your grace should fall
(Let's Dance) For fear tonight is all
```

Line numbers (colour is your user colour)

Current line highlight (colour is your user colour).

Selection regions of other connected users, coloured according to their chosen user colour.

Edit text as you would in any other text editor, and see changes made by other users reflected in the document as you go. The Editor supports a large number of IDE-like hotkeys:

Ctrl+F, Ctrl+R, F3	Find, Replace, Find Next
Ctrl+G	Go-To
Ctrl+Z, Ctrl+Y	Undo, Redo
Tab, Shift+Tab	Increase/decrease indent
Ctrl+U, Shift+Ctrl+U	Toggle uppercase/lowercase of selection
Ctrl+Shift+C	Toggles C-style comment prefix (//) of selected lines
Alt+Up, Alt+Down	Moves selected lines up/down
Shift+Del	Removes current line
Ctrl+B, Ctrl+Shift-B, Ctrl+N, Ctrl+Shift+N	Adds, removes and navigates bookmarks
Ctrl+Mousewheel, Ctrl+(NumpadPlus, NumpadMinus, 0)	Zoom
Ctrl+M, Ctrl+E	Start/stop macro recording, execute macro
Alt+F [char]	finds nearest [char]

CREATING A DEDICATED OTEX SERVER

It is also possible to host a server without launching the editor interface. To do so, use the command-line dedicated server.

Run OTEX**x86**\OTEXServer.exe if your machine is 32-bit, or OTEX**x64**\OTEXServer.exe if it is 64-bit. Connecting clients do not need to be using the same platform as the server version you are running; the communication between clients and servers is platform-agnostic.

By default, OTEX Server will host a private temporary file session on the default port (55550) for up to 10 users. Customize it with command-line parameters:

OTEXSERVER [file] [/EDIT|/NEW] [/PORT port] [/NAME name] [/PASSWORD pass] [/PUBLIC] [/MAXCLIENTS max] [/?]

file	Path to the plain text file to collaboratively edit. Omitting file path will create a temporary session (client edits will be lost when the server is shut down).
/EDIT	If a file already exists at the given path, edit it (do not overwrite with a new file). This is default.
/NEW	Opposite of /EDIT.
/PORT port	Port on which to listen for new OTEX TCP client connections. Can be any value between 1024-55560 or 55565-65535. Default is 55550.
/NAME name	A friendly name for the server. Limit of 32 characters (overflow is truncated).
/PASSWORD pass	Password required to connect to this server. Must be between 6 and 32 characters. Omit to allow clients to connect without a password.
/PUBLIC	Regularly broadcast the presence of this server to OTEX clients.
/MAXCLIENTS max	Maximum number of clients to allow. Defaults to 10, caps at 100.
/?	Prints help and exits.

Arguments may appear in any order. /SWITCHES and file paths are not case-sensitive.

ATTRIBUTIONS

OTEX Editor uses a diff generation package called **DiffPlex** to create the client-side OT operations when the text is edited by the user. DiffPlex can found on GitHub and Nuget.

OTEX Editor uses a very powerful RichTextBox alternative called **FastColoredTextBox**, which helps provides a lot of the more advanced features of the editor interface. FastColoredTextBox can found on GitHub, Nuget and CodeProject.

Icons used within OTEX Editor are variously sourced from websites like Iconfinder and Flaticon, or created by hand. Any icons sourced from icon repository websites were selected based on "free for commercial use" licenses (i.e. I saved myself from having to remember to specifically credit every single one).

The OTEX Framework uses a form of Operational Transformation called the "NICE" approach. See:
Shen, Haifeng, and Chengzheng Sun. "Flexible notification for collaborative systems." *Proceedings of the 2002 ACM conference on Computer supported cooperative work*. ACM, 2002.

SOURCE CODE

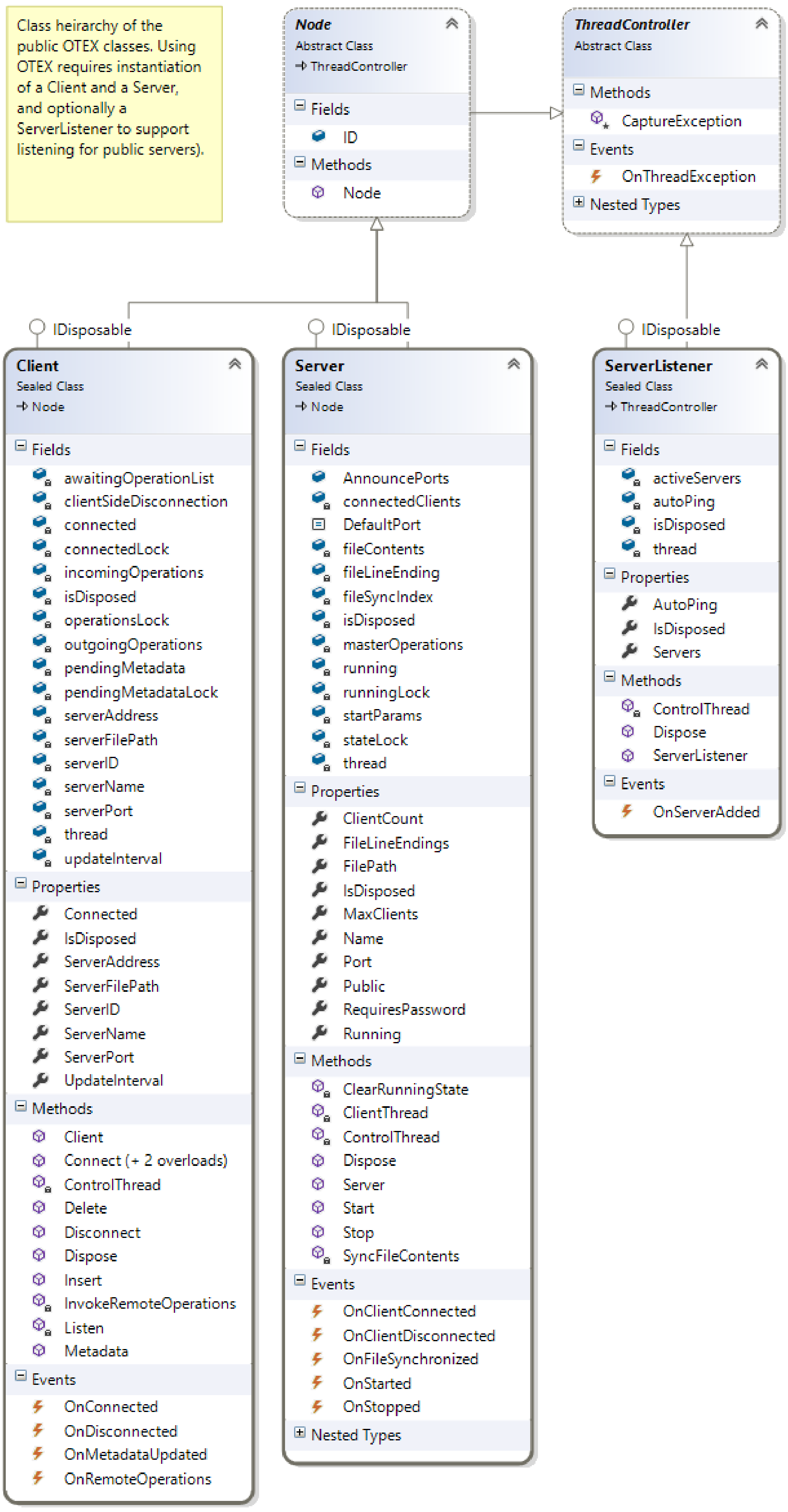
The OTEX Framework is built in such a way that the Client, Server and ServerListener are all fully self-contained and implemented class objects, only requiring user code to "plug-in" to it by subscribing to the desired events. Case in point: the dedicated server application just an **extremely** thin command-line-wrangling wrapper around OTEX.Server. Similarly, the editor application is a relatively lightweight application too (though, any code requiring the manipulation of user interfaces is necessarily slightly more complex than a simple command-line application).

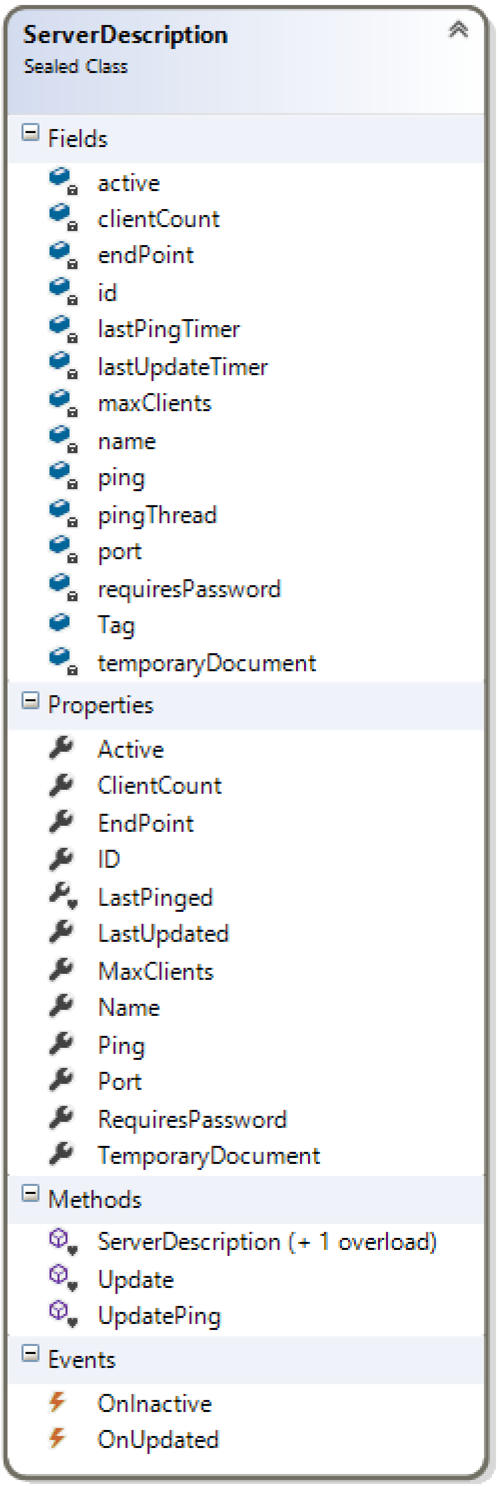
Code for the OTEX framework can be found on GitHub: https://github.com/marzer/OTEX.

Note for COMP7722: I have thoroughly commented the code, and specifically noted where something is relevant to the topic. These notes can be found by searching the C# files for the string "COMP7722".

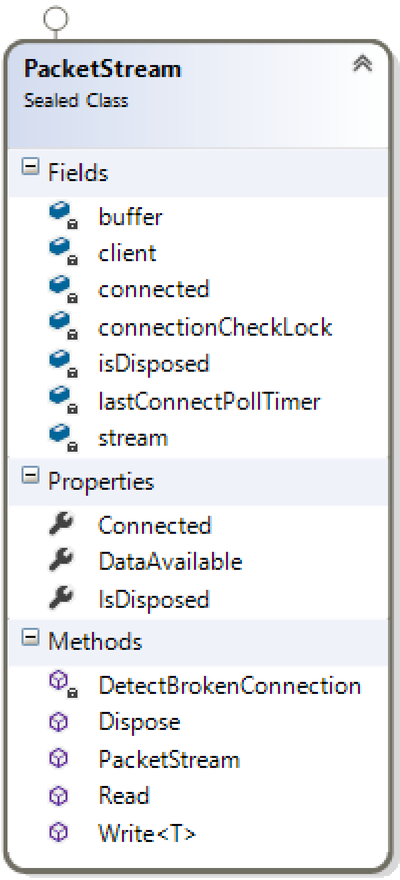
The code relies on a utility library (**Marzersoft.dll**), which is a personal library of useful classes, extensions and wrappers I've built over my years working with C#. It's not open-source, but OTEX can be compiled by linking against the Marzersoft.dll files included with the OTEX distribution.

APPENDIX: OTEX CLASS DIAGRAMS

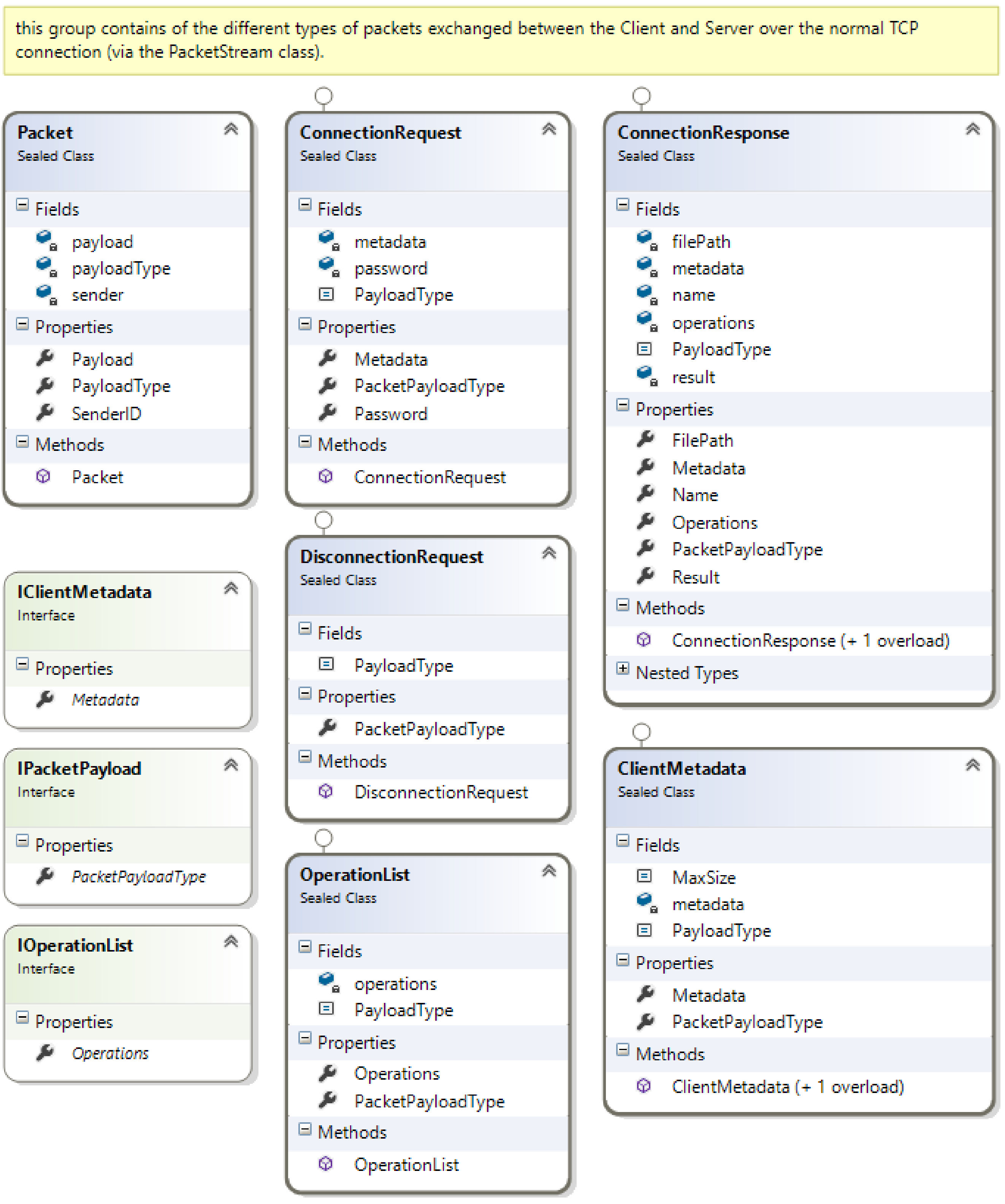


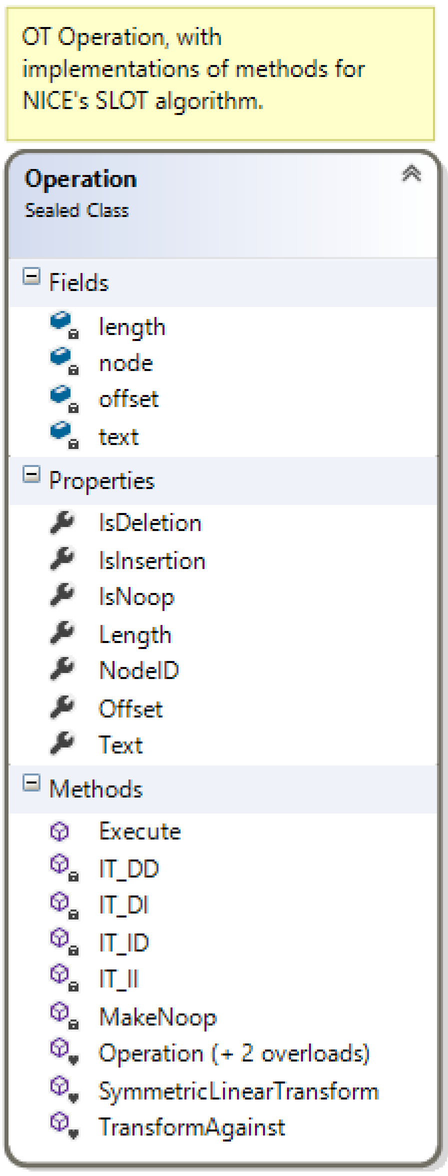


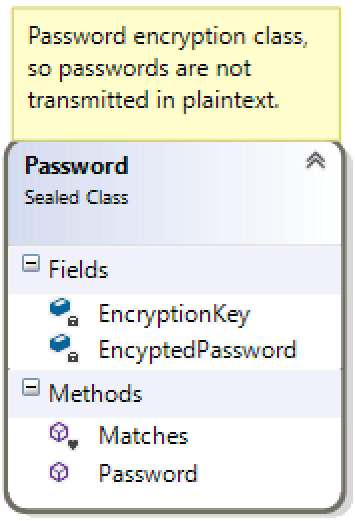
ServerDescriptions are sent out over UDP by Public servers, and captured by ServerListeners. At the server end these are treated as plain-old-data, but at the ServerListener end they are merged with new data and events are triggered notifying subscribers of updates to the server's state (e.g. the server administrator has changed the server's name).

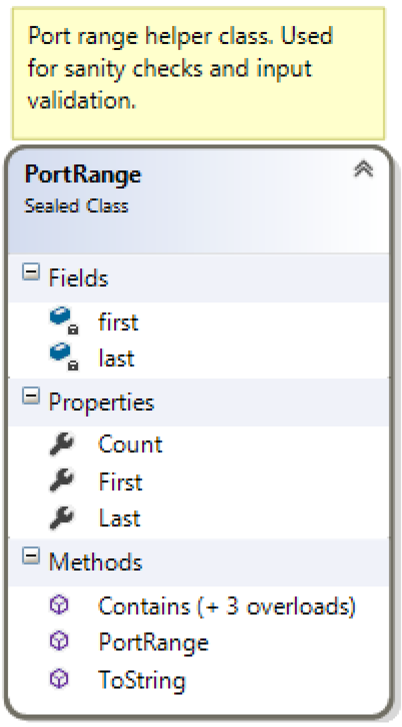


PacketStream manages the state of a TcpClient connection and handles the serialization and deserialization of Serializable objects implementing the IPacketPayload interface.


this group contains of the different types of packets exchanged between the Client and Server over the normal TCP connection (via the PacketStream class).


OT Operation, with implementations of methods for NICE's SLOT algorithm.
Operation
Sealed Class
Fields
length
node
offset
text
Properties
IsDeletion
IsInsertion
IsNoop
Length
NodeID
Offset
Text
Methods
Execute
IT_DD
IT_DI
IT_ID
IT_II
MakeNoop
Operation (+ 2 overloads)
SymmetricLinearTransform
TransformAgainst


Password encryption class, so passwords are not transmitted in plaintext.
Password
Sealed Class
Fields
EncryptionKey
EncyptedPassword
Methods
Matches
Password


Port range helper class. Used for sanity checks and input validation.
PortRange
Sealed Class
Fields
first
last
Properties
Count
First
Last
Methods
Contains (+ 3 overloads)
PortRange
ToString