

# A case Study of WebWork.

Reflections on using the Webwork platform for mathematics.

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# Outline

- 1 Preliminaries
- 2 Our case study
- 3 Future work

# WebWork

Webwork is a learning platform for mathematics aimed at third level students:

- It is an online system, able to scale from a handful to hundreds of students.
- WebWork understands algebraic logic and functions, for example  $2\sqrt{2} = \sqrt{8}$ , and  $f(x) = \cos^2 \theta - \sin^2 \theta = \cos 2\theta$ .
- Already contains an extensive data base of problems and is open source.

# Examples

## CA5: Problem 18

[Previous Problem](#)
[Problem List](#)
[Next Problem](#)
This set is **visible to students**.(1 point) [Library/Hope/Multi1/02-02-Linear-systems/Geometry\\_01/Geometry\\_01.pg](#)

Match each system of linear equations with the graph that most closely matches it. Click on a graph to make it larger.

1. 
$$\begin{cases} x = 0 \\ z = 1 \\ z = -1 \end{cases}$$

2. 
$$\begin{cases} z = 0 \\ y = 0 \\ x + y = 0 \end{cases}$$

3. 
$$\begin{cases} z = 1 \\ 3z = 3 \\ -1/z = -1 \end{cases}$$

4. 
$$\begin{cases} x = 0 \\ x - z = 0 \\ z = 0 \end{cases}$$

5. 
$$\begin{cases} -x + z = 1 \\ x + z = 1 \\ z = -1 \end{cases}$$



A



B



C



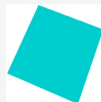
D



E



F



G



H



I

# WebWork issues

Some reflections:

- The larger the class size the larger the server and maintenance needed. Some minor computer skills are useful.
- Students struggle at first with typing, but if introduced gradually they progress without issues, primer videos help.
- Students enjoy the freedom to do assignments whenever/where ever
- WebWork is not modern, and the interface and problems do need to be trialed beforehand.
- Small class numbers.

# Server log files

The following work was done in conjunction with Dr F. Hegarty (NUIG/MSP - Berkeley).

Motivated by an article on WebWork server files, A. Prat & W.J. Code (WeBWorK log files as a rich source of data on student homework behaviours) which can be found on the arxiv, we embarked to examine our own server log files.

Specifically we hoped to identify any usage patterns that might give insights to how students are using the system.

# Methods

Our method follows:

- SSH into

```
user@webworkserver.school  
cd /var/log/apache2
```

- Parse the log files:

```
193.1.88.1 - - [08/Feb/2021:08:50:53 +0000] "GET  
/webwork2_files/js/vendor/bootstrap/js/  
bootstrap.js HTTP/1.1" 200 62164 "http://  
stuwebwork01.lit.ie/webwork2" "Mozilla/5.0 (Windows  
NT 10.0; Win64; x64) AppleWebKit/537.36  
(KHTML, like Gecko) Chrome/88.0.4324.146 Safari/537"
```

- Some data analysis.

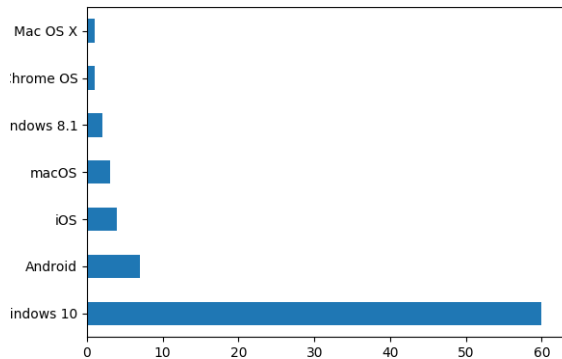
# Issues

Before we present the data, we make note of the following issues specific to this case study and Technological University of the Shannon:

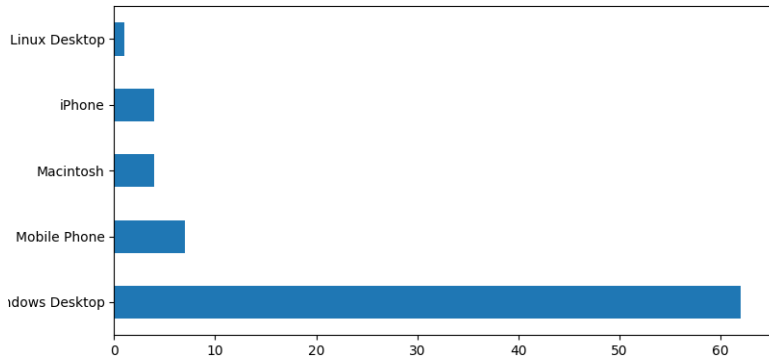
- All off campus access was via a VPN, thus masking IP address' and losing data.
- Campus PC's are almost all Windows 10.
- Multi device log ins from the same users was masked with VPN usage.



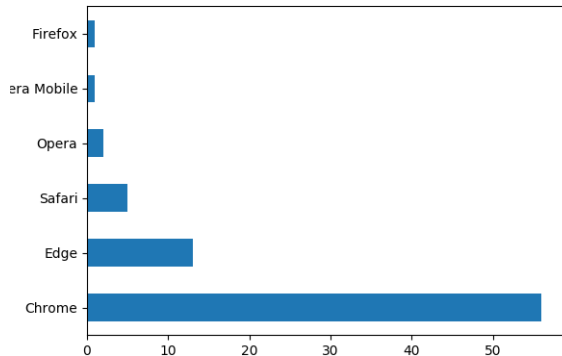
# Our data I



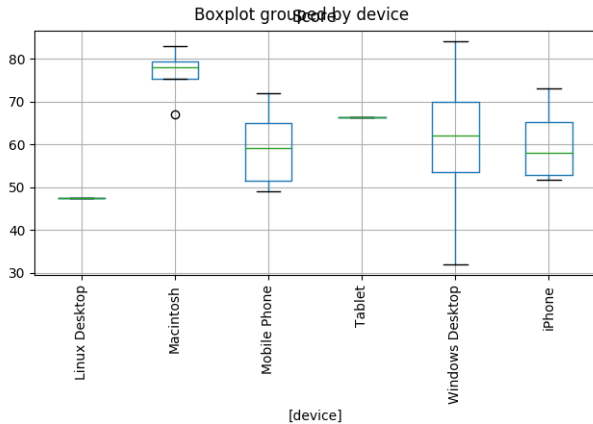
# Our data II



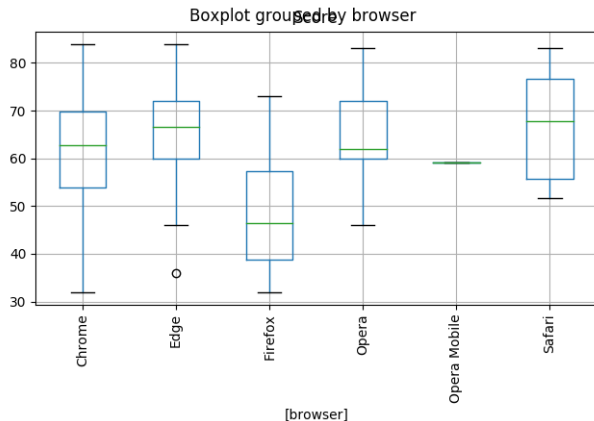
# Our data III



# Our data IV



# Our data V



# Future work

- A full case study of students attitudes to webwork,
- A larger sample size,
- A fuller analysis of the data similar to the paper cited above.

Thank you, Questions?  
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