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DATA ANALYTICS INTERNSHIP

H2O Wave: Beer Wall Tutorial Activity

Documentation

Jewel Anne A. Reyes
BS Computer Science
Polytechnic University of the Philippines

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Jewel Anne A. Reyes
BS Computer Science
Polytechnic University of the Philippines

Task Overview

H2O Wave is a software stack for building beautiful, low-latency, realtime, browser-based applications and dashboards entirely in Python without using HTML, Javascript, or CSS.

It excels at capturing data, visualizations, and graphics from multiple sources and broadcasting them live over the web.

H2O Wave gives your Python programs the ability to push content to connected clients as it happens, in realtime. In other words, it lets your program display up-to-date information without asking your users to hit their browser's reload button.You can use H2O Wave for:

- Dashboards and visualizations for live monitoring.
- Live information displays: news, tickers, health, or performance data.
- Apps that require instant notifications, updates, events, or alerts.
- Apps that involve messaging: chat, bots, etc.
- Collaborative apps: whiteboards, sharing, etc.

You can also use H2O Wave when you find yourself reaching for a web application framework - it can handle regular (non-realtime) apps just fine.

In this task, we are required to create a program using H2O Wave and Python to run a page periodically and observe the changes live in the browser.

The program we'll be writing is a verse generator for the runaway mid-20th century smash hit, 99 Bottles of Beer, which looks something like this:

- 99 bottles of beer on the wall, 99 bottles of beer.
- Take one down, pass it around, 98 bottles of beer on the wall...

- 98 bottles of beer on the wall, 98 bottles of beer.
- Take one down, pass it around, 97 bottles of beer on the wall...

The program will be analogous to the "Hello, World!" program, with the addition of a loop. We'll generate a verse every second, and observe the verse change in the browser in realtime. After that, we'll take a stab at making our program a bit more efficient, introducing how expressions work.

Jewel Anne A. Reyes
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Codes

The following are the steps with codes that was used for this task.

Step 1: Open a terminal and start the Wave Server

```
cd wave
waved.exe
```

Step 2: Set up a virtual environment

```
python -m venv venv
.\venv\Scripts\activate
```

Step 3: Write the program

```
import time
from h2o_wave import site, ui

page = site['/beer']

beer_card = page.add('wall', ui.markdown_card(
    box='1 1 4 2',
    title='99 Bottles of Beer',
    content='',
))

for i in range(99, 0, -1):
    beer_card.content = f"""
{i} bottles of beer on the wall, {i} bottles of beer.

Take one down, pass it around, {i - 1} bottles of beer on the wall...
"""
    page.save()
    time.sleep(1)
```

Step 4: Run the program

```
python beer_wall.py
```

Jewel Anne A. Reyes
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Step 5: Write the program efficiently

```
import time
from h2o_wave import site, ui

page = site['/beer']

beer_verse = '''={{before}} bottles of beer on the wall, {{before}} bottles of
beer.

Take one down, pass it around, {{after}} bottles of beer on the wall...
'''

beer_card = page.add('wall', ui.markdown_card(
    box='1 1 4 2',
    title='99 Bottles of Beer',
    content=beer_verse,
    data=dict(before='99', after='98'),
))

for i in range(99, 0, -1):
    beer_card.data.before = str(i)
    beer_card.data.after = str(i - 1)
    page.save()
    time.sleep(1)
```

Step 6: Run the edited program

```
python efficient_beer_wall.py
```

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Screenshots of Work

Figure 1. Start the wave server using waved.exe command

```
C:\Users\reyes\wave>waved.exe
2023/09/01 12:04:46 #
2023/09/01 12:04:47 #
2023/09/01 12:04:47 #   H2O Wave
2023/09/01 12:04:47 #   0.26.2 20230803101450
2023/09/01 12:04:47 #   © 2021 H2O.ai, Inc.
2023/09/01 12:04:47 #
2023/09/01 12:04:47 #
2023/09/01 12:04:47 #   Running at http://localhost:10101/
2023/09/01 12:04:47 #
2023/09/01 12:04:47 # {"address":":10101","base-url":"/","t":"listen","web-dir":"C:\\Users\\reyes\\wave\\www"}
2023/09/01 12:04:47 # {"error":"listen tcp :10101: bind: Only one usage of each socket address (protocol/network address/port) is normally permitted
.","t":"listen_no_tls"}

C:\Users\reyes\wave>2023/09/01 12:05:00 # {"addr":"[::1]:64126","route":"/","t":"ui_add"}
```

Figure 2. Setting the virtual environment

```
Microsoft Windows [Version 10.0.22621.2134]
(c) Microsoft Corporation. All rights reserved.

C:\Users\reyes\OneDrive\Desktop\h2o wave tutorials>cd C:\Users\reyes\OneDrive\Desktop\h2o wave tutorials\Act4_H2O_Beer Wall

C:\Users\reyes\OneDrive\Desktop\h2o wave tutorials\Act4_H2O_Beer Wall>python -m venv venv

C:\Users\reyes\OneDrive\Desktop\h2o wave tutorials\Act4_H2O_Beer Wall>.\venv\Scripts\activate

(venv) C:\Users\reyes\OneDrive\Desktop\h2o wave tutorials\Act4_H2O_Beer Wall>
```

Figure 3. Python code in Visual Studio Code

beer_wall.py

h2o wave tutorials > Act4_H2O_Beer Wall > beer_wall.py > ...

```python
import time
from h2o_wave import site, ui

page = site['/beer']

beer_card = page.add('wall', ui.markdown_card(
    box='1 1 4 2',
    title='99 Bottles of Beer',
    content='',
))

for i in range(99, 0, -1):
    beer_card.content = f"""
{i} bottles of beer on the wall, {i} bottles of beer.

Take one down, pass it around, {i - 1} bottles of beer on the wall...
"""
    page.save()
    time.sleep(1)
```

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Figure 4. Running the program in a terminal

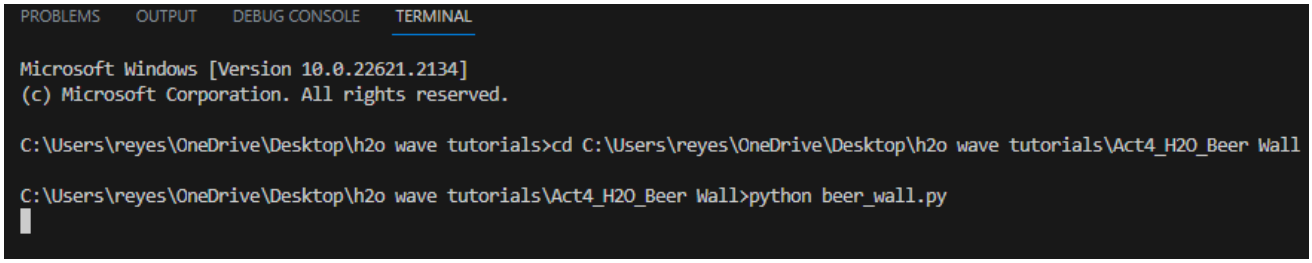
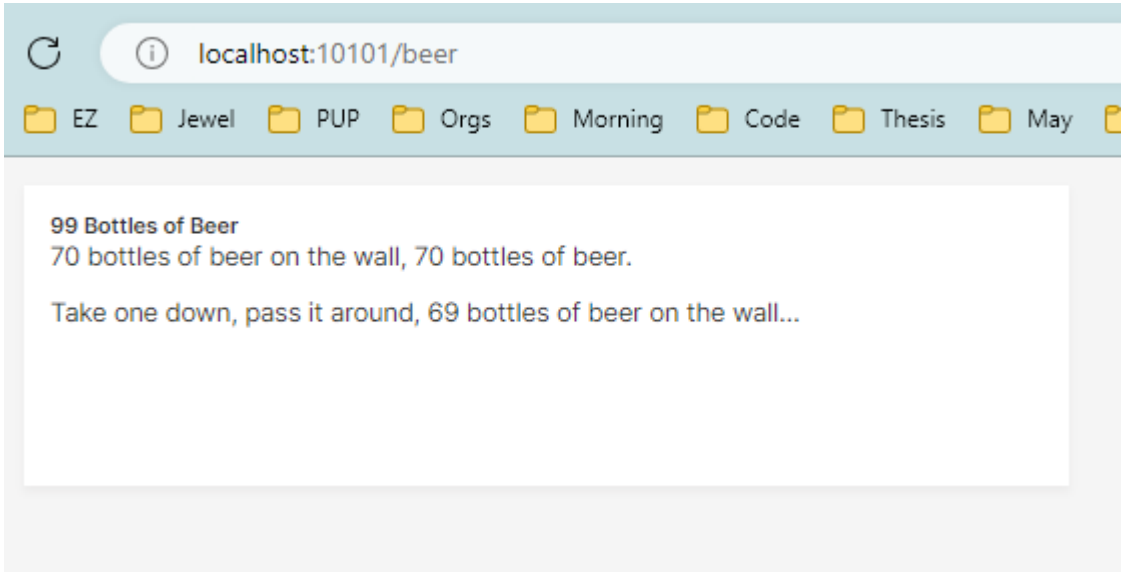


Figure 5. Going to localhost:10101/beer and checking the output



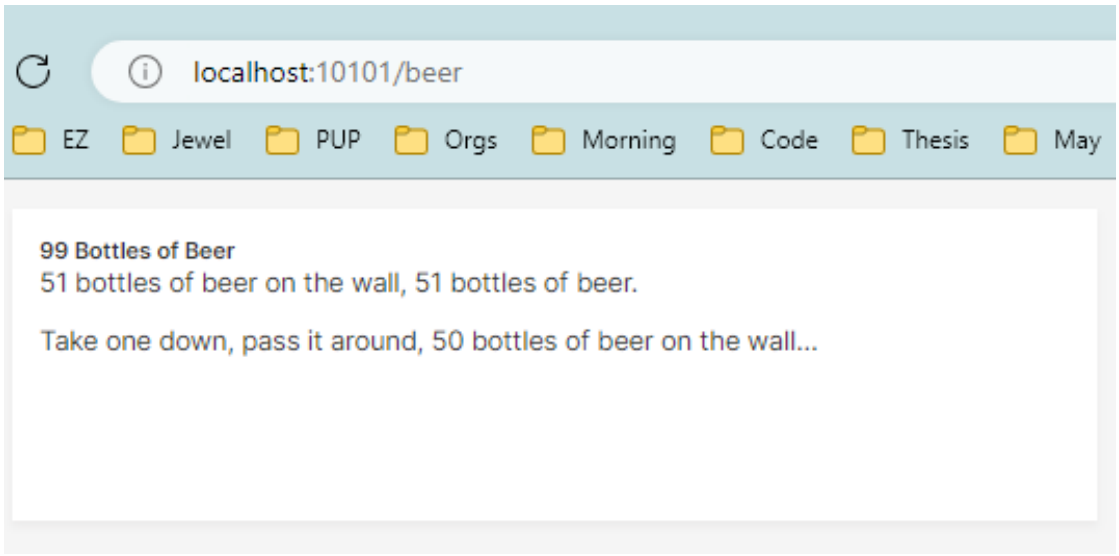


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Figure 6. Wave Server Log

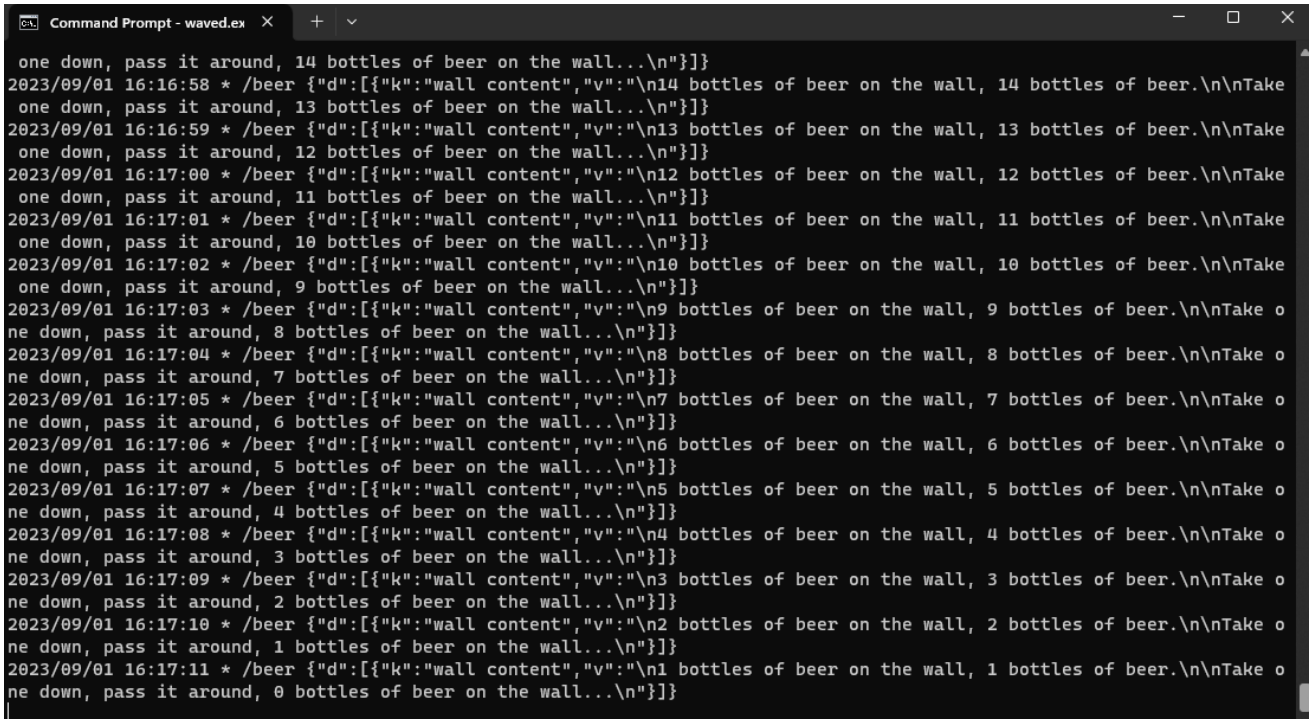

Figure 7. More efficient Python Code in Visual Code Studio

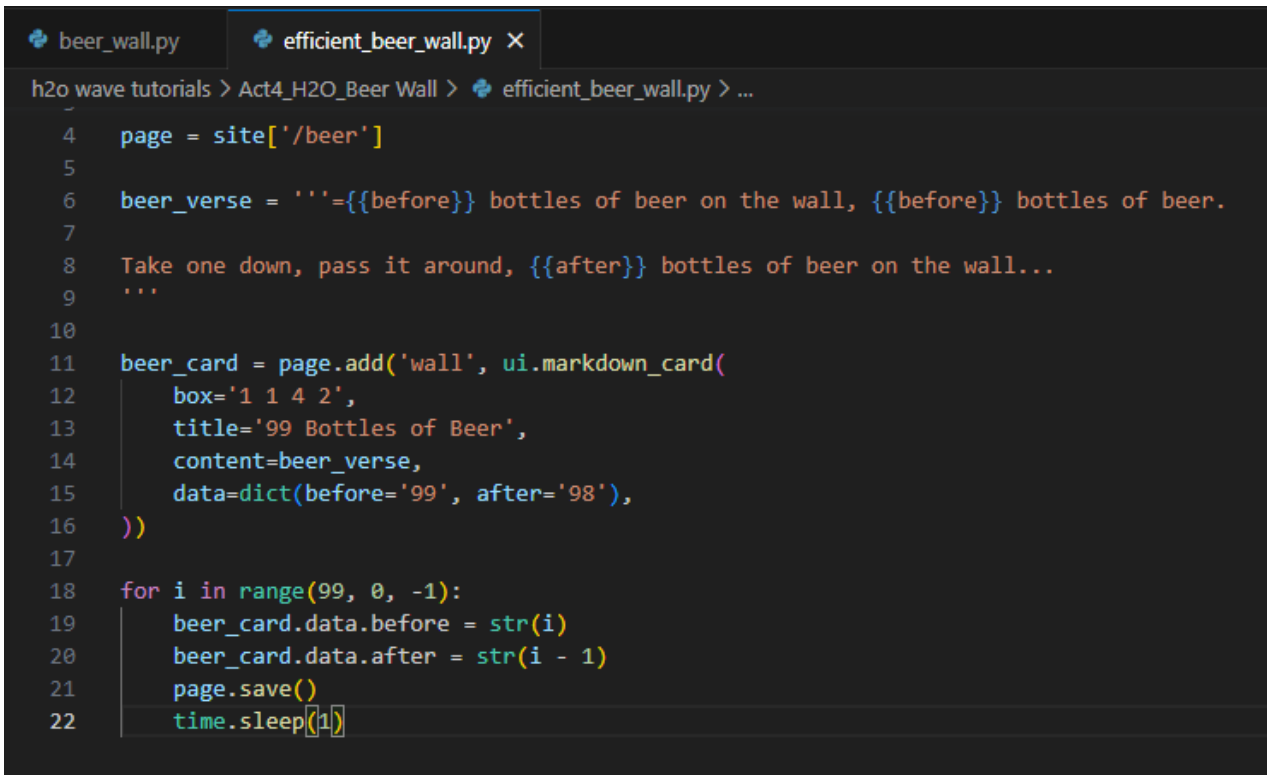

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Figure 8. Running the program in a terminal

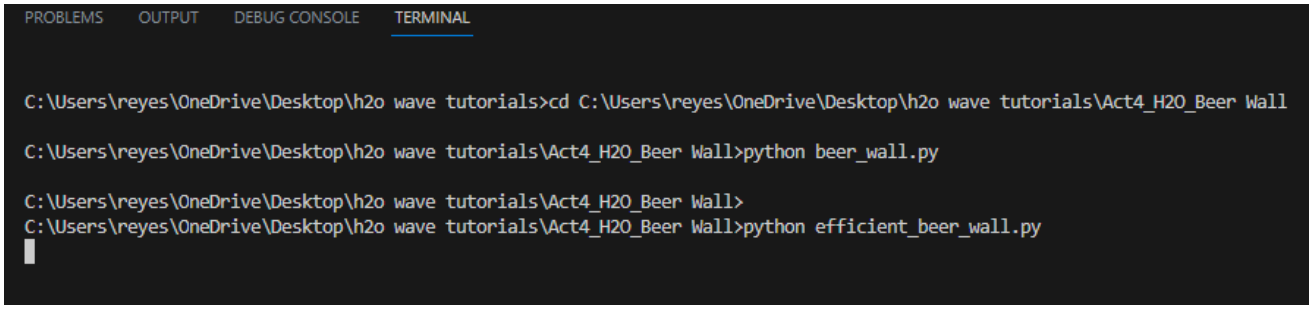
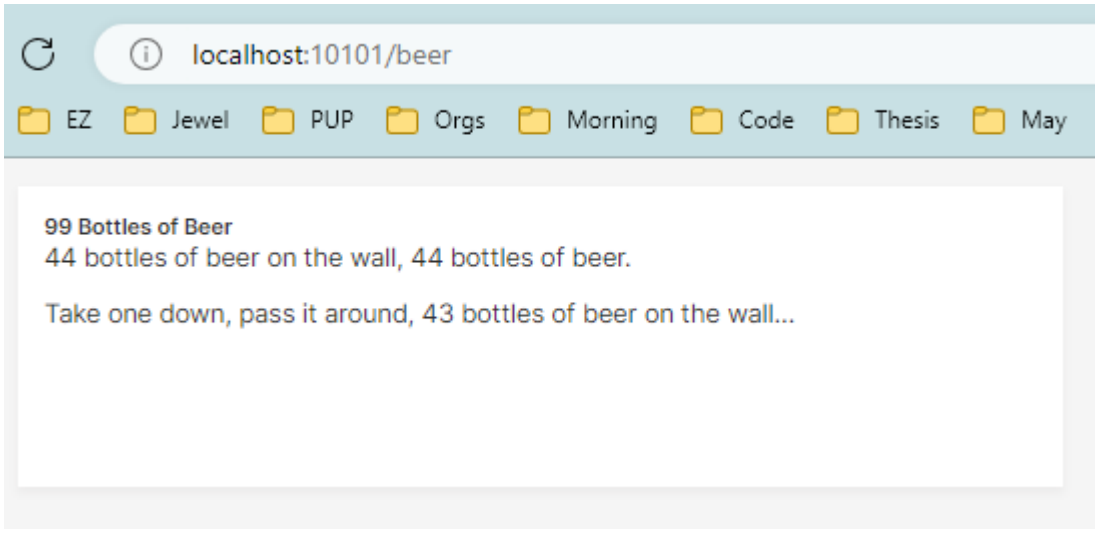


Figure 9. Going to localhost:10101/beer and checking the output



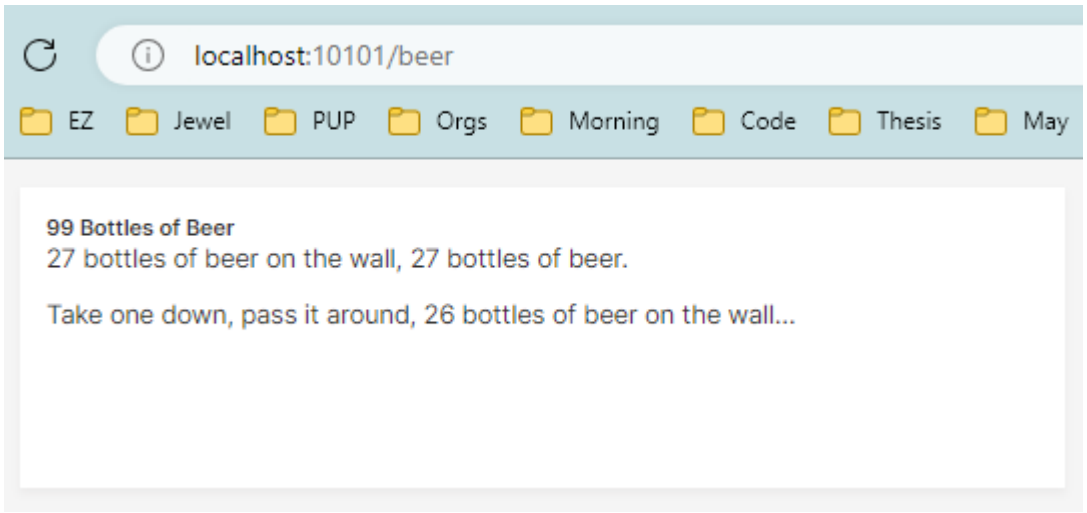
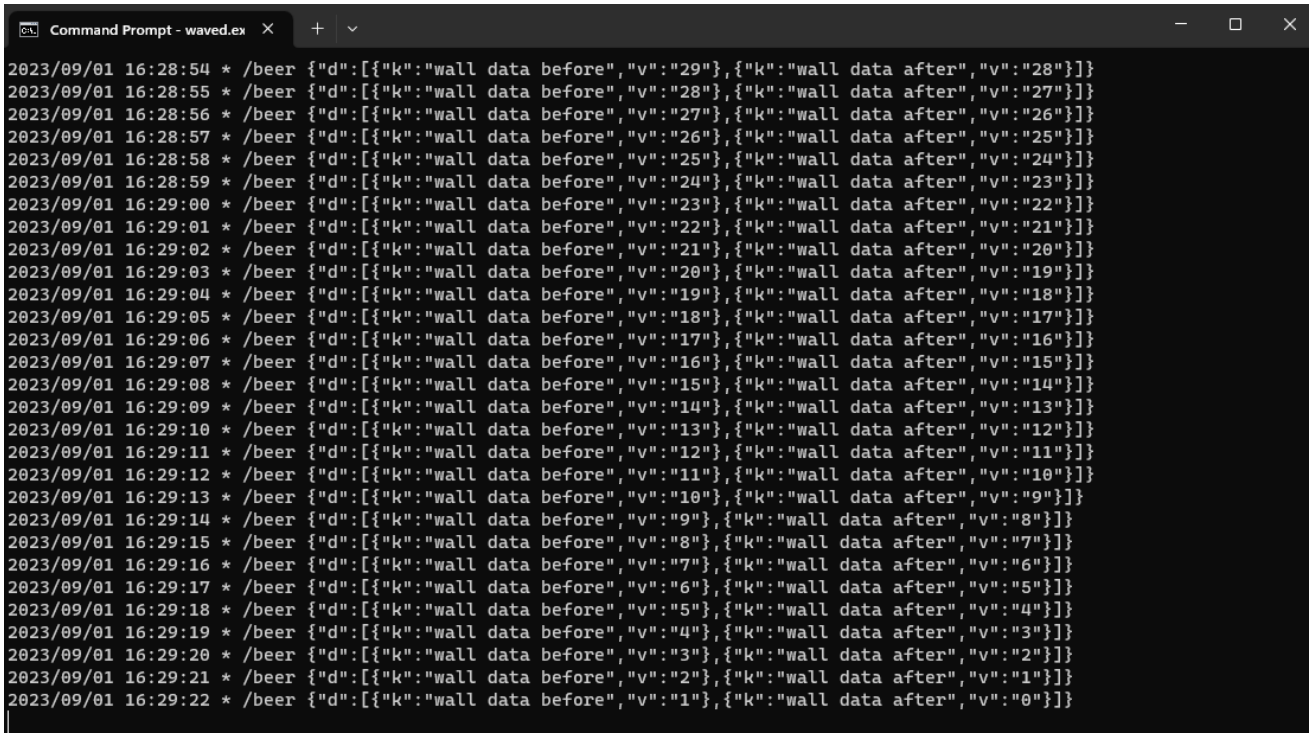


Figure 10. Wave Server Log



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