

1. Response Time (using <QElapsedTimer> library)

- Initial Load Time: 107 ms

```
Tic-Tac-Toe-Game X
19:32:10: Starting C:\Users\KHALED\Github-Repos\Tic-Tac-Toe-Game\Tic-Tac-Toe-Game\build\Desktop_Qt_6_7_0_MinGW_64_bit-Debug\debug\Tic-Tac-Toe-Game.exe...
Initial Load Time: 107 milliseconds
```

- Input Response Time

Login window buttons

- New Account: 40 ms
- Login: 130 ms
- Cancel: 3 ms

```
21:26:54: Starting C:\Users\KHALED\Github-Repos\Tic-Tac-Toe-Game\Tic-Tac-Toe-Game\build\Desktop_Qt_6_7_0_MinGW_64_bit-Debug\debug\Tic-Tac-Toe-Game.exe...
New Account Response Time: 40 milliseconds
user match!
now player 1 name is: khaled
Login Response Time: 130 milliseconds
Cancel Response Time: 3 milliseconds
21:27:26: C:\Users\KHALED\Github-Repos\Tic-Tac-Toe-Game\Tic-Tac-Toe-Game\build\Desktop_Qt_6_7_0_MinGW_64_bit-Debug\debug\Tic-Tac-Toe-Game.exe crashed.
```

Register window buttons

- Register: ~ 1 – 2 ms
- Back: ~83 – 86 ms

```
21:34:00: Starting C:\Users\KHALED\Github-Repos\Tic-Tac-Toe-Game\Tic-Tac-Toe-Game\build\Desktop_Qt_6_7_0_MinGW_64_bit-Debug\debug\Tic-Tac-Toe-Game.exe...
User registered successfully!
Register Response Time: 2 milliseconds
Back Response Time: 86 milliseconds
Username already exists. Please choose a different username.
Register Response Time: 1 milliseconds
Back Response Time: 83 milliseconds
21:34:35: C:\Users\KHALED\Github-Repos\Tic-Tac-Toe-Game\Tic-Tac-Toe-Game\build\Desktop_Qt_6_7_0_MinGW_64_bit-Debug\debug\Tic-Tac-Toe-Game.exe exited with code 0
```

Entry window buttons

- Profile: 17 ms
- History: 16 ms
- PVP: 16 ms
- PVAI: 18 ms

```
21:46:26: Starting C:\Users\KHALED\Github-Repos\Tic-Tac-Toe-Game\Tic-Tac-Toe-Game\build\Desktop_Qt_6_7_0_MinGW_64_bit-Debug\debug\Tic-Tac-Toe-Game.exe...
user match!
now player 1 name is: khaled
Profile Response Time: 17 milliseconds
History Response Time: 16 milliseconds
PVP Response Time: 16 milliseconds
PVAI Response Time: 18 milliseconds
21:46:54: C:\Users\KHALED\Github-Repos\Tic-Tac-Toe-Game\Tic-Tac-Toe-Game\build\Desktop_Qt_6_7_0_MinGW_64_bit-Debug\debug\Tic-Tac-Toe-Game.exe crashed.
```

Game Settings window buttons

- Swap: 0 ms
- Start: 25 ms
- Back: 8 ms

```
21:39:03: Starting C:\Users\KHALED\Github-Repos\Tic-Tac-Toe-Game\Tic-Tac-Toe-Game\build\Desktop_Qt_6_7_0_MinGW_64_bit-Debug\debug\Tic-Tac-Toe-Game.exe...
user match!
now player 1 name is: khaled
Swap Response Time: 0 milliseconds
Swap Response Time: 0 milliseconds
Start Response Time: 25 milliseconds
Back Response Time: 8 milliseconds
21:39:46: C:\Users\KHALED\Github-Repos\Tic-Tac-Toe-Game\Tic-Tac-Toe-Game\build\Desktop_Qt_6_7_0_MinGW_64_bit-Debug\debug\Tic-Tac-Toe-Game.exe
crashed.
```

Game window buttons

- Grid: 0 ms
- Play Again: 0 ms
- Home: 11 ms

```
21:52:25: Starting C:\Users\KHALED\Github-Repos\Tic-Tac-Toe-Game\Tic-Tac-Toe-Game\build\Desktop_Qt_6_7_0_MinGW_64_bit-Debug\debug\Tic-Tac-Toe-Game.exe...
user match!
now player 1 name is: khaled
Grid Response Time: 0 milliseconds
Play Again Response Time: 0 milliseconds
Home Response Time: 11 milliseconds
21:52:50: C:\Users\KHALED\Github-Repos\Tic-Tac-Toe-Game\Tic-Tac-Toe-Game\build\Desktop_Qt_6_7_0_MinGW_64_bit-Debug\debug\Tic-Tac-Toe-Game.exe
crashed.
```

History window buttons

- Replay: 29 ms
- Back: 8 ms

```
21:57:24: Starting C:\Users\KHALED\Github-Repos\Tic-Tac-Toe-Game\Tic-Tac-Toe-Game\build\Desktop_Qt_6_7_0_MinGW_64_bit-Debug\debug\Tic-Tac-Toe-Game.exe...
user match!
now player 1 name is: khaled
Replay Response Time: 29 milliseconds
Back Response Time: 8 milliseconds
21:57:49: C:\Users\KHALED\Github-Repos\Tic-Tac-Toe-Game\Tic-Tac-Toe-Game\build\Desktop_Qt_6_7_0_MinGW_64_bit-Debug\debug\Tic-Tac-Toe-Game.exe
crashed.
```

Replay window buttons

- Next: 0 ms
- Previous: 0 ms
- Back: 16 ms

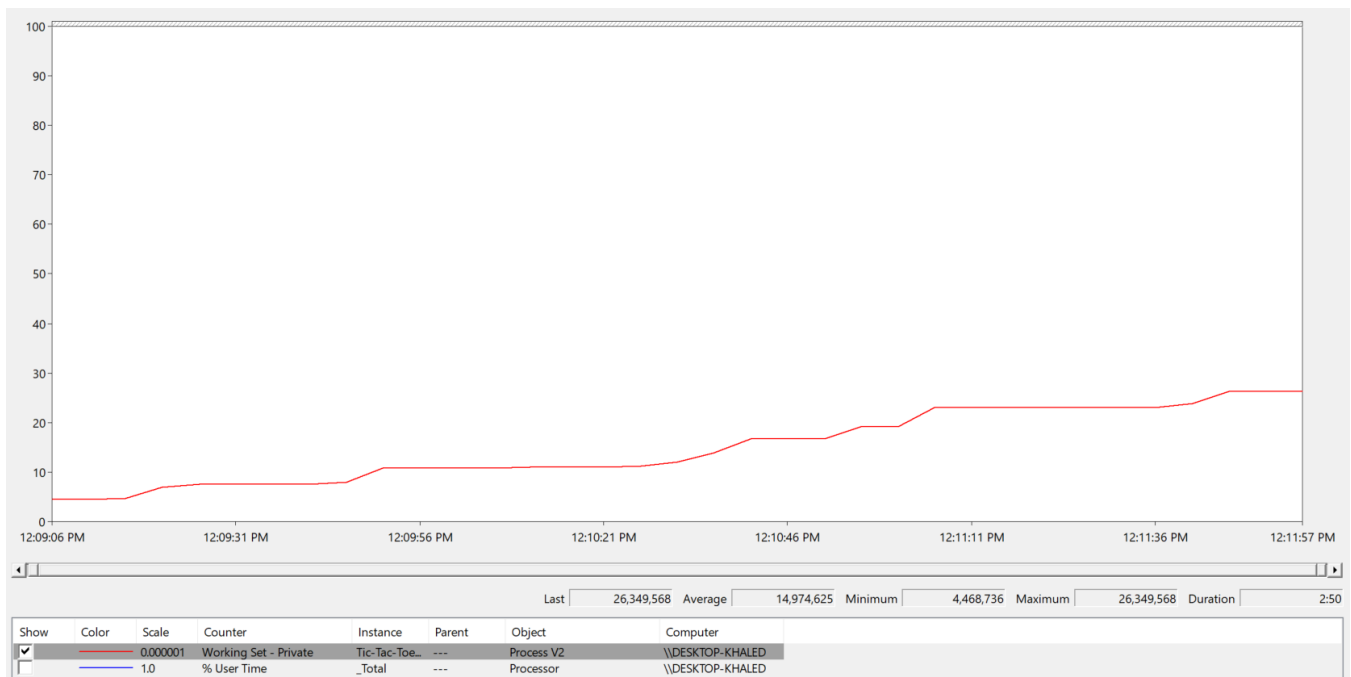
```
22:01:18: Starting C:\Users\KHALED\Github-Repos\Tic-Tac-Toe-Game\Tic-Tac-Toe-Game\build\Desktop_Qt_6_7_0_MinGW_64_bit-Debug\debug\Tic-Tac-Toe-Game.exe...
user match!
now player 1 name is: khaled
Next Response Time: 0 milliseconds
Previous Response Time: 0 milliseconds
Back Response Time: 16 milliseconds
22:01:56: C:\Users\KHALED\Github-Repos\Tic-Tac-Toe-Game\Tic-Tac-Toe-Game\build\Desktop_Qt_6_7_0_MinGW_64_bit-Debug\debug\Tic-Tac-Toe-Game.exe
crashed.
```

2. Memory Usage

- Measurement tool: Performance monitor > Process > Private Working Set

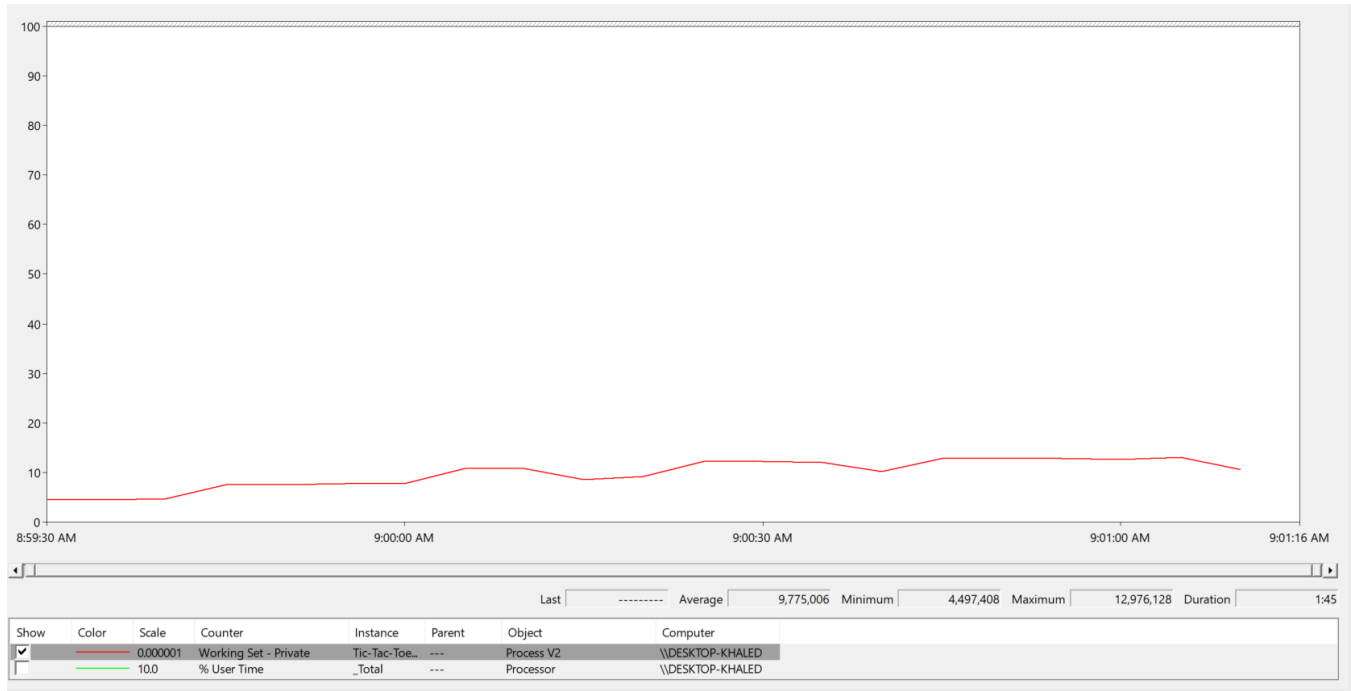
Represents the private physical memory currently in use by the Tic-Tac-Toe.exe process.

- Results



- Minimum Memory Usage: 4.469 MB
- Memory Usage keeps increasing over time

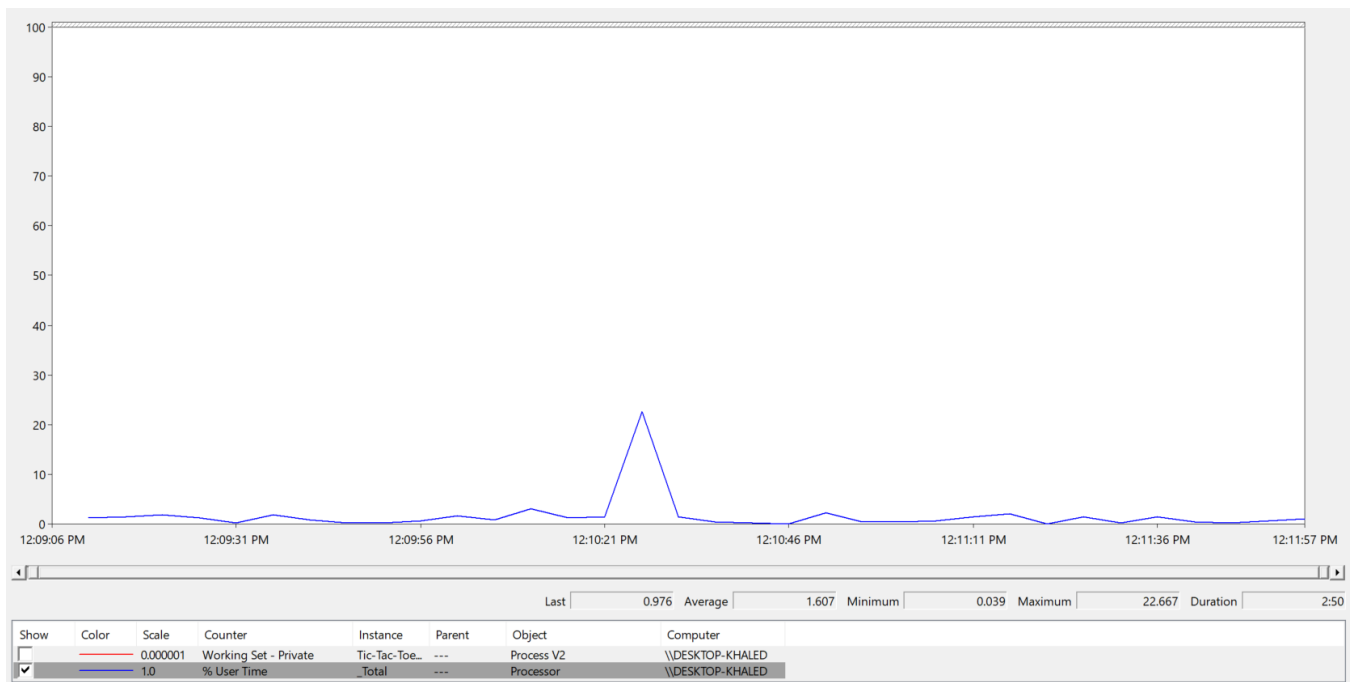
- Optimization



- Minimum Memory Usage: 4.497 MB
- Memory usage saturates at: 13 MB
- Average Memory Usage: 9.775 MB

3. CPU utilization

- Measurement tool: Performance monitor > Processor > Total User Time (application only, excludes OS CPU usage)
- Results



- Average CPU Utilization: 1.6%
- Peak CPU Utilization: 22.667%