Background Experiments

Calculations

1. **RTT:** We have calculated the RTT using traceroute.

    ```
    traceroute <ip-address>
    ```

2. **MaxHops**: After finding out of the RTT for a particular server, we can find the Max number of hops on the same terminal, as shown in the fig below.

3. **Geolocation**: We can find out the location of the server using the below link
    https://ipinfo.io

4. **Anycast**: Anycast of the server can be checked in ipinfo. This provides a report of the server details.

5. **Framerate:** We can see the framerate on the HoloLens device, after enabling it on windows device portal.

6. **Data in bytes**: Data bytes in Wireshark, can be found under conversations.
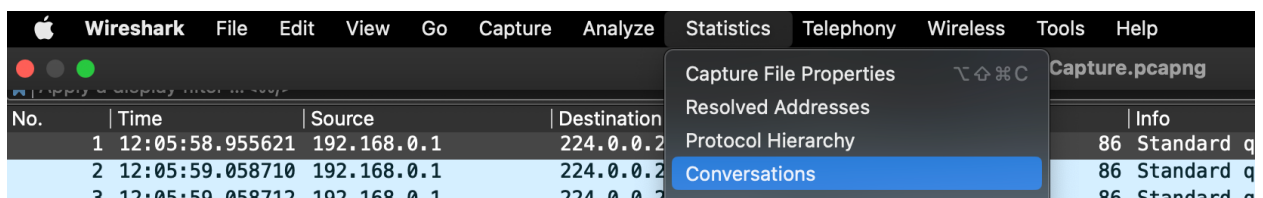
7. **Wireshark Duration :** This can be found in Wireshark, under conversations.
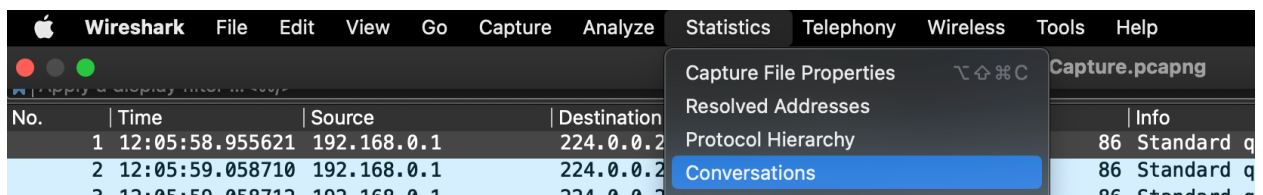
8. **Throughput(bits/sec):** We can select a packet from the Wireshark, under conversation and then get the respective values like Data in bytes and Wireshark duration.

   Formulae: (Data in bytes/Wireshark duration)*8

9. **Background Servers:** The servers can be filtered using the source Ip in Wireshark.

WPA

WPA can be used to analyze the CPU utilization, disk usage, memory, and CPU idle time for a particular application.

Definitions
*%**Weight Sum:** significant impact of a particular performance event on the overall System performance or CPU Utilization.*
***CPU Utilization Sample**: This is measured every 100 milliseconds.*
***CPU Utilization Precise**: This is measured accurately every microsecond or nano second.*
***CPU Idle time**: Time CPU is idle while running the JoinXR application.*

Disk usage:
To find the disk usage for the application in WPA analyzer, select **'Disk usage'** in the Graph explorer, and then choose **'Activity by I/O type'** from the options displayed, as shown in the figure below.

Figure 6.6.3: WPA Disk usage analysis
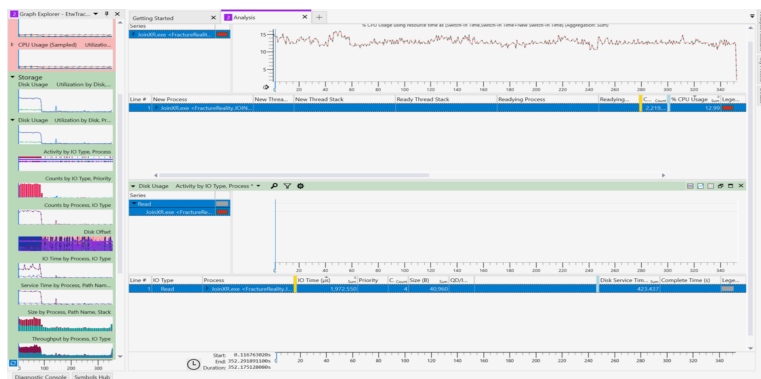
The IO time in the disk usage is measured in tick. Tick is a unit of time that is used to measure time intervals in an operating system and to synchronize the system activities. Tick unit time will be equal to 100 nanoseconds. The column count refers to number of disk operation(Read/Write).

Memory(Resident memory).

To find the memory for the application in WPA analyzer, select '**Memory'** in the Graph explorer, and then choose the '**Resident Memory'** from the option displayed as shown in the figure below.
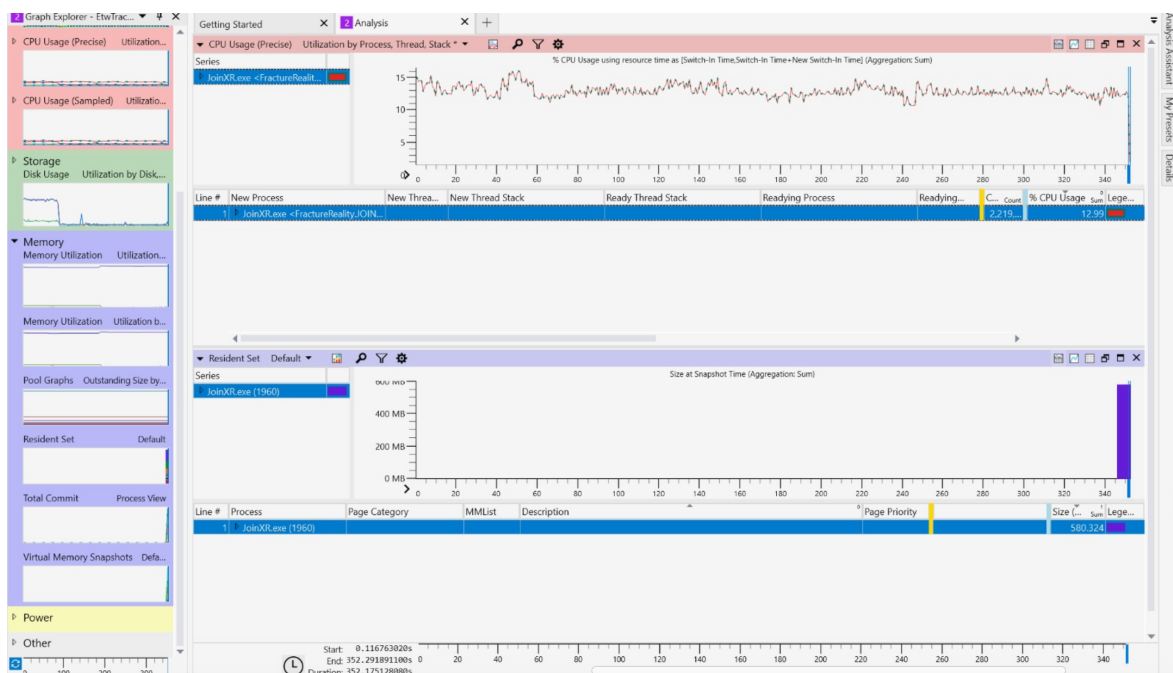
The **Resident Set** under the **Memory graph** in WPA is to calculate memory utilization. The Resident set includes all the memory that the process is currently using. Memory gets allocated to the process by the operating system.

CPU Utilization

To find the CPU Utilization in WPA analyzer, select '**Computation'** in the Graph explorer, and choose '**CPU Sampled**' or '**CPU Precise**' from the options displayed as shown in the figure below.
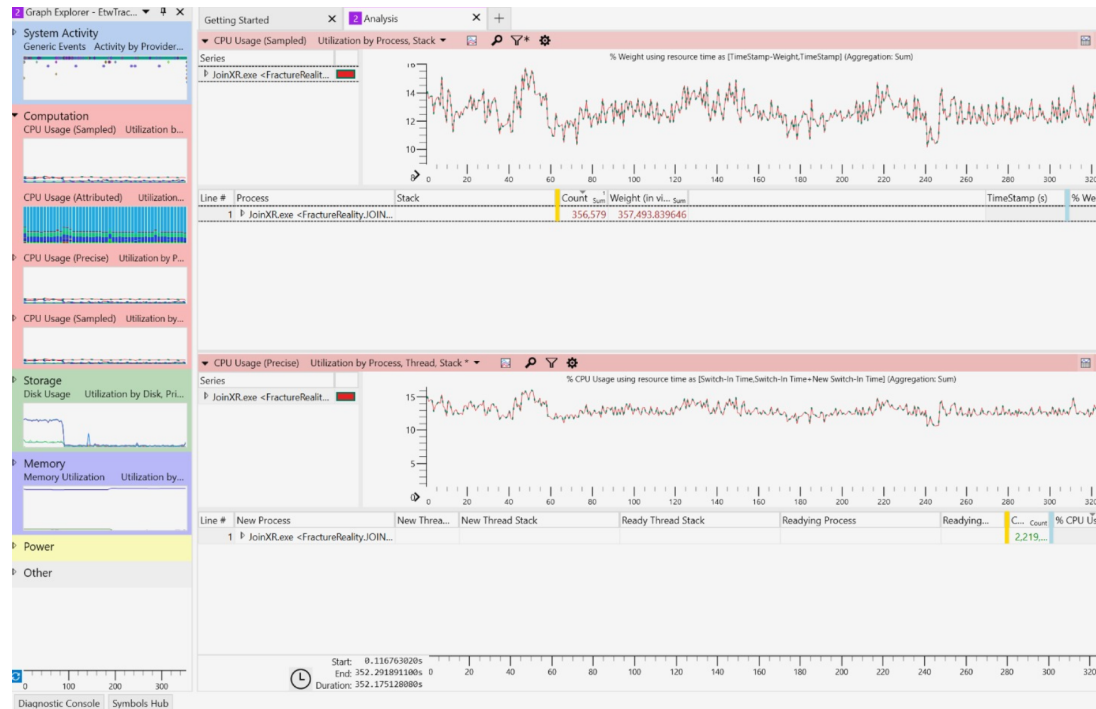
WPA has mainly two important computations for calculating the CPU utilization, that is CPU Usage Sampled- which is measured every 100 milliseconds and CPU Usage Precise -which is more accurate as it is measured every microsecond or nano second.

CPU Idle state

To find the CPU idle state in WPA Analyzer, select '**Power**' in Graph explorer and choose '**CPU Idle states'** from the options displayed as shown in the figure below.

CPU Usage (Sampled) Utilizatio...

CPU Usage (Attributed) Utilizati...

▷ CPU Usage (Precise) Utilizati...

▷ CPU Usage (Sampled) Utilizati...

▷ **Storage**
Disk Usage Utilization by Disk,...

▷ **Memory**
Memory Utilization Utilization...

▼ **Power**

▷ CPU Idle States State by Type, Cpu

PDC Resiliency Activity Resilienc...

No data

▷ Platform Idle State Platform Idle...

▷ **Other**

| 0 | 100 | 200 | 300 |

Diagnostic Console   Symbols Hub

Getting Started ✕   2 Analysis ✕   +

▼ CPU Usage (Precise)   Utilization by Process, Thread, Stack * ▼   🔍 ▽ ⚙

% CPU Usage using resource time as [Switch-In Time,Switch-In Time+New Switch-In Time] (Aggregation: Sum)

15

10

5

| 0 | 20 | 40 | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 260 | 280 | 300 | 320 | 340 |

Line #	New Process	New Threa...	New Thread Stack	Ready Thread Stack	Readying Process	Readying...	C... Count	% CPU Usage Sum	L...
1	▷ JoinXR.exe <FractureReality.JOIN...						2,219,...	12.99 ▇	

▼ CPU Idle States   State by Type, Cpu ▼   🔍 ▽ ⚙

State (Numeric) using resource time as [Entry Time,Entry Time+Sum:Duration] (Aggregation: Average)

Series
▷ Actual
▷ Target

4

2

| 0 | 20 | 40 | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 260 | 280 | 300 | 320 | 340 |

Line #	Type	CPU	Entry Time (s)	Exit Time (s)	Sum:Duration (ms) Sum	Flags	Clock Owner	Due Interrupt	Idle Duration	State (N... Avg	L...
1	▷ Actual				2,816,911.854096					1	
2	▷ Target				2,817,401.024640					2	

Start: 0.116763020s
End: 352.291891100s
Duration: 352.175128080s

| 0 | 20 | 40 | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 260 | 280 | 300 | 320 | 340 |