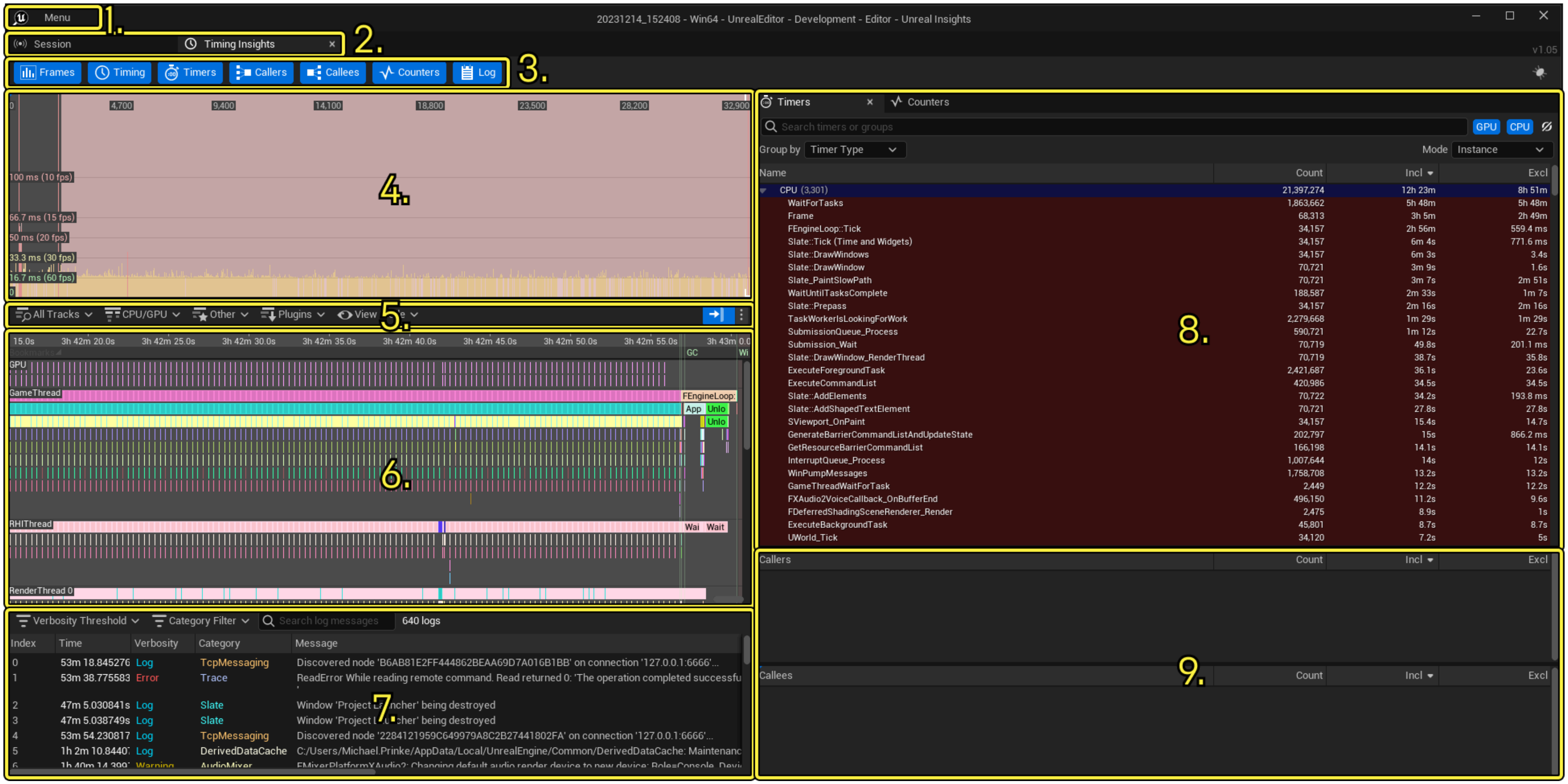
Timing Insights

An Overview of the Timing Insights Window in Unreal Insights.

Timing Insights is the main window used for profiling UE trace sessions. It displays per-frame performance data and provides tools for inspecting individual processes, including separate tracks for the **CPU** and **GPU**. Using Timing Insights, you can:

- Determine which frames are experiencing spikes in required processing time.
- Inspect the timeline for those frames to see which timing and counter events are taking the most time.
- See a detailed breakdown of what events are processing on which threads and cores.
- Highlight timer and counter events to see how many instances of them are running.
- View the hierarchy of callers and callees for an event.
- Isolate events and plot them on a graph alongside your timeline for a clear visualization of processing spikes.
- Trace the execution path of Tasks.
- View CPU context switches.



Name	Count	Incl	Excl
CPU (3,301)	21,397,274	12h 23m	8h 51m
WaitForTasks	1,863,662	5h 48m	5h 48m
Frame	68,313	3h 5m	2h 49m
FEngineLoop::Tick	34,157	2h 56m	559.4 ms
Slate::Tick (Time and Widgets)	34,157	6m 4s	771.6 ms
Slate::DrawWindows	34,157	6m 3s	3.4s
Slate::DrawWindow	70,721	3m 9s	1.6s
Slate_PaintSlowPath	70,721	3m 7s	2m 51s
WaitUntilTasksComplete	188,587	2m 33s	1m 7s
Slate::Prepass	34,157	2m 16s	2m 16s
TaskWorkerIsLookingForWork	2,279,668	1m 29s	1m 29s
SubmissionQueue_Process	590,721	1m 12s	22.7s
Submission_Wait	70,719	49.8s	201.1 ms
Slate::DrawWindow_RenderThread	70,719	38.7s	35.8s
ExecuteForegroundTask	2,421,687	36.1s	23.6s
ExecuteCommandList	420,986	34.5s	34.5s
Slate::AddElements	70,722	34.2s	193.8 ms
Slate::AddShapedTextElement	70,721	27.8s	27.8s
SViewport_OnPaint	34,157	15.4s	14.7s
GenerateBarrierCommandListAndUpdateState	202,797	15s	866.2 ms
GetResourceBarrierCommandList	166,198	14.1s	14.1s
InterruptQueue_Process	1,007,644	14s	12s
WinPumpMessages	1,758,708	13.2s	13.2s
GameThreadWaitForTask	2,449	12.2s	12.2s
FXAudio2VoiceCallback_OnBufferEnd	496,150	11.2s	9.6s
FDeferredShadingSceneRenderer_Render	2,475	8.9s	1s
ExecuteBackgroundTask	45,801	8.7s	8.7s
UWorld_Tick	34,120	7.2s	5s

Callers	Count	Incl	Excl

Callees	Count	Incl	Excl

Index	Time	Verbosity	Category	Message
0	53m 18.845276	Log	TcpMessaging	Discovered node 'B6AB81E2FF444862BEAA69D7A016B1BB' on connection '127.0.0.1:6666'...
1	53m 38.775583	Error	Trace	ReadError While reading remote command. Read returned 0: 'The operation completed successfu
2	47m 5.030841s	Log	Slate	Window 'Project Launcher' being destroyed
3	47m 5.038749s	Log	Slate	Window 'Project Launcher' being destroyed
4	53m 54.230817	Log	TcpMessaging	Discovered node '2284121959C649979A8C2B27441802FA' on connection '127.0.0.1:6666'...
5	1h 2m 10.8440	Log	DerivedDataCache	C:/Users/Michael.Prinke/AppData/Local/UnrealEngine/Common/DerivedDataCache: Maintenanc
6	1h 40m 14.399	Warning	AudioMixer	FMixerPlatformXAudio2: Changing default audio render device to new device: Role=Console, Devi

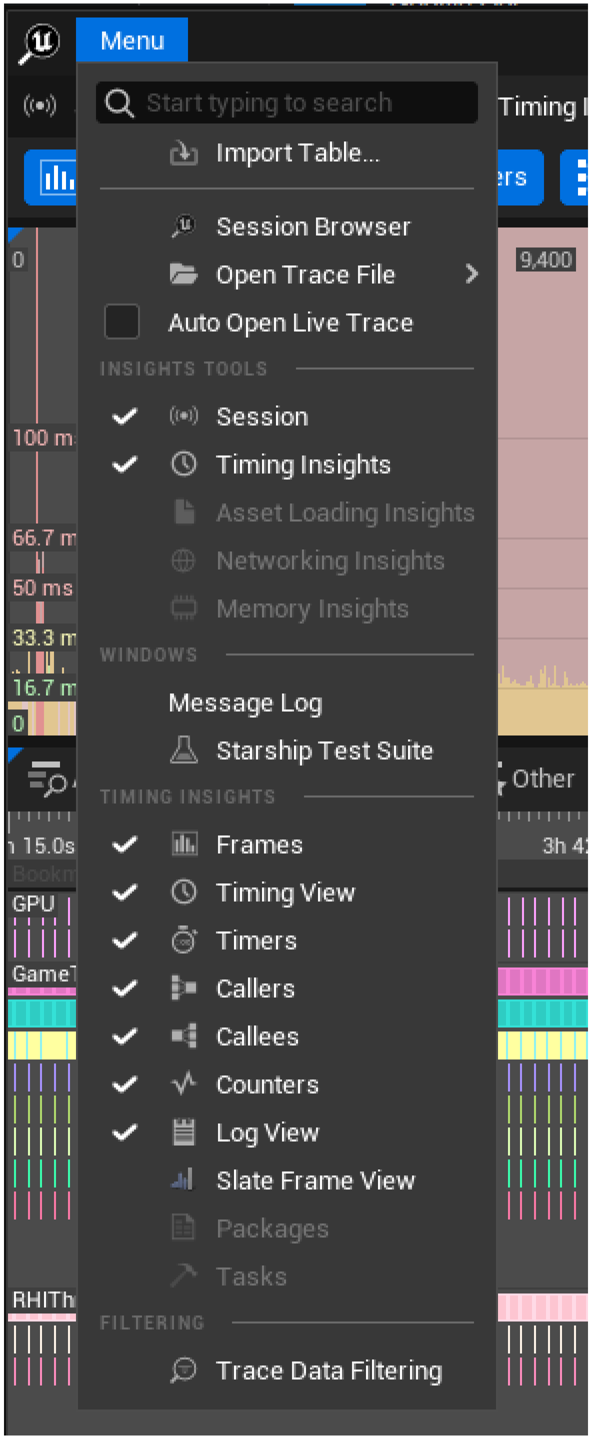
The Timing Insights window features the following elements:

Index	Name	Description
1	Main Menu	Drop-down menu providing options for configuring the Timing Insights window and accessing other menus.
2	Session and Timing Insights Tabs	Switch between your session info (if using a live session) and the Timing Insights window.

Index	Name	Description
3	Main Toolbar	Toggles visibility of other menu panels.
4	Frames Panel	A timeline showing frame-by-frame resource usage data.
5	Timing Panel Toolbar	A toolbar that filters tracks in the Timing Panel.
6	Timing Panel	A panel that shows detailed information about resource usage separated into different tracks. Tracks include general CPU/GPU as well as individual threads.
7	Log	A list of log outputs created during the trace session. Click a log entry to highlight its position in the Timing Panel.
8	Timers and Counters	Displays a list of processes in the highlighted portions of the Frames/Timing panels as well as information about how much time each process takes to execute.
9	Callers and Callees	When you select a function in the Counters or Timers panels, these display what functions are calling it (Callers) and what functions it calls (Callees) during the current highlighted frame.

Main Menu

Click the **Menu** button in the upper-left corner to open Timing Insights' dropdown menu, which provides options for configuring the Timing Insights window and manipulating files.

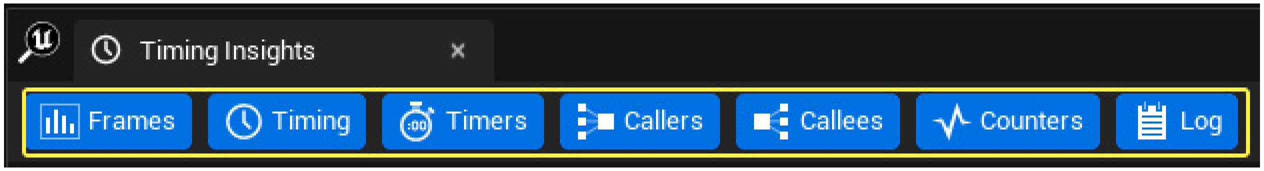

Menu
Start typing to search
Import Table...
Session Browser
Open Trace File
Auto Open Live Trace
INSIGHTS TOOLS
✓ Session
✓ Timing Insights
Asset Loading Insights
Networking Insights
Memory Insights
WINDOWS
Message Log
Starship Test Suite
TIMING INSIGHTS
✓ Frames
✓ Timing View
✓ Timers
✓ Callers
✓ Callees
✓ Counters
✓ Log View
Slate Frame View
Packages
Tasks
FILTERING
Trace Data Filtering
Timing I
9,400
0
100 ms
66.7 m
50 ms
33.3 m
16.7 m
0
Other
15.0s
3h 4
GPU
GameT
RHITh

Index	Name	Description
1	File Management	Options for opening trace files, including manually importing tables.
2	Insights Tools	A list of currently active Insights windows/tabs.
3	Windows	Additional windows for debugging the Timing Insights tool.
4	Timing Insights	A list of panels in the Timing Insights window. Click to toggle them on and off.
5	Filtering	Options for filtering during live sessions.

Main Toolbar

The **toolbar** provides the capability to select blocks of time to view in groups, sort or categorize data, and review log output.

You can toggle the visibility to display data for that frame in the **Timing**, **Timers**, **Callers**, **Callees**, **Counters**, and **Log tracks** by clicking on each respective track.



You can select blocks of time to view in aggregate, show or hide the respective panels. sort or categorize data, and review log output. To do this, click on a single frame in the **Frames panel**, or click and drag a section of the scrub bar at the top of the Timing panel, known as the **Time Ruler.**

Frames Panel

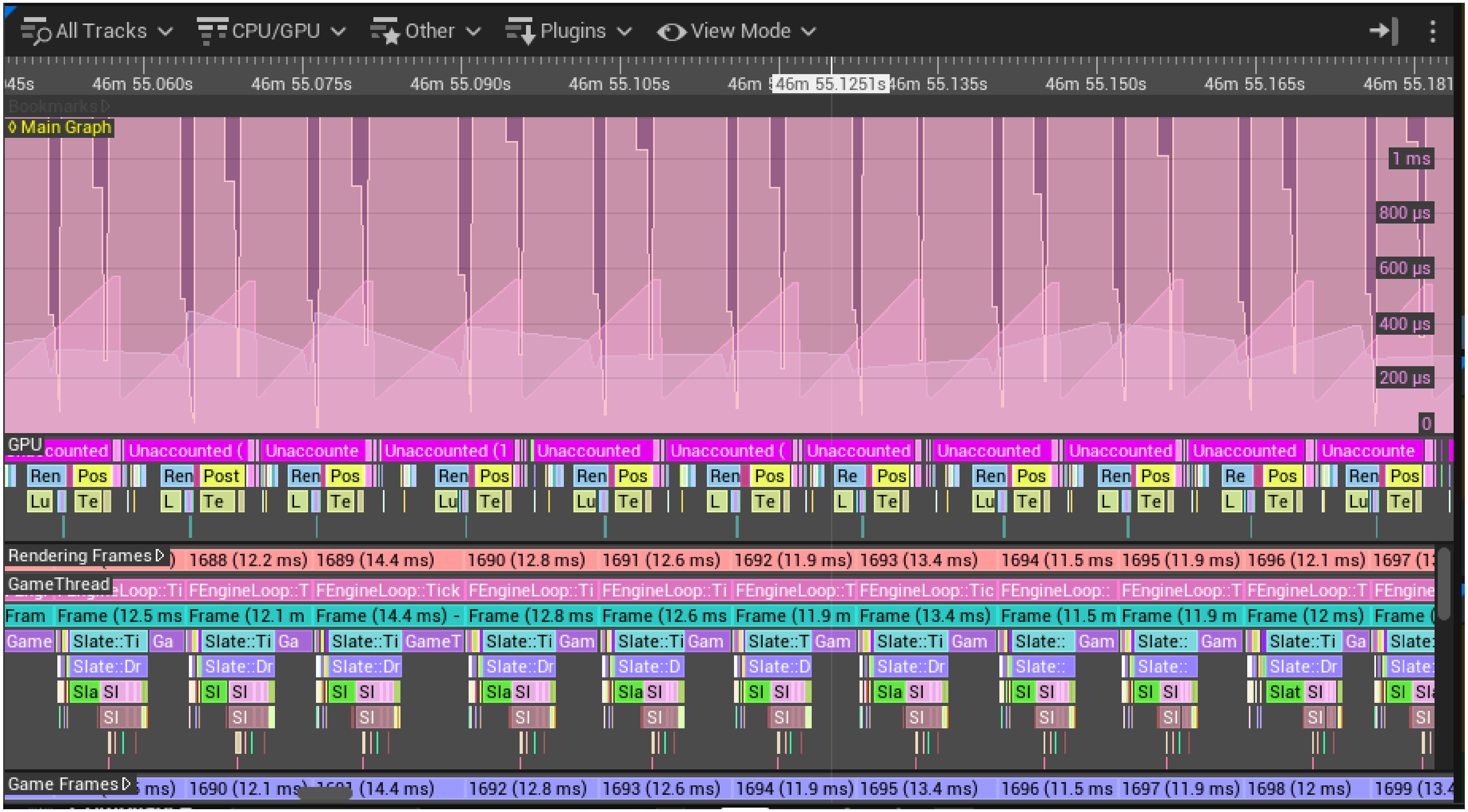
The **Frames** panel displays the total time taken by each frame using a bar graph format. This is useful for identifying general trends, such as low performance or framerate drops when a level is loaded, an unoptimized scene is visible, or spawning a large number of Actors simultaneously.

The frames panel displays events on a timeline.

For more information, see the Frames Panel page.

Timing Panel

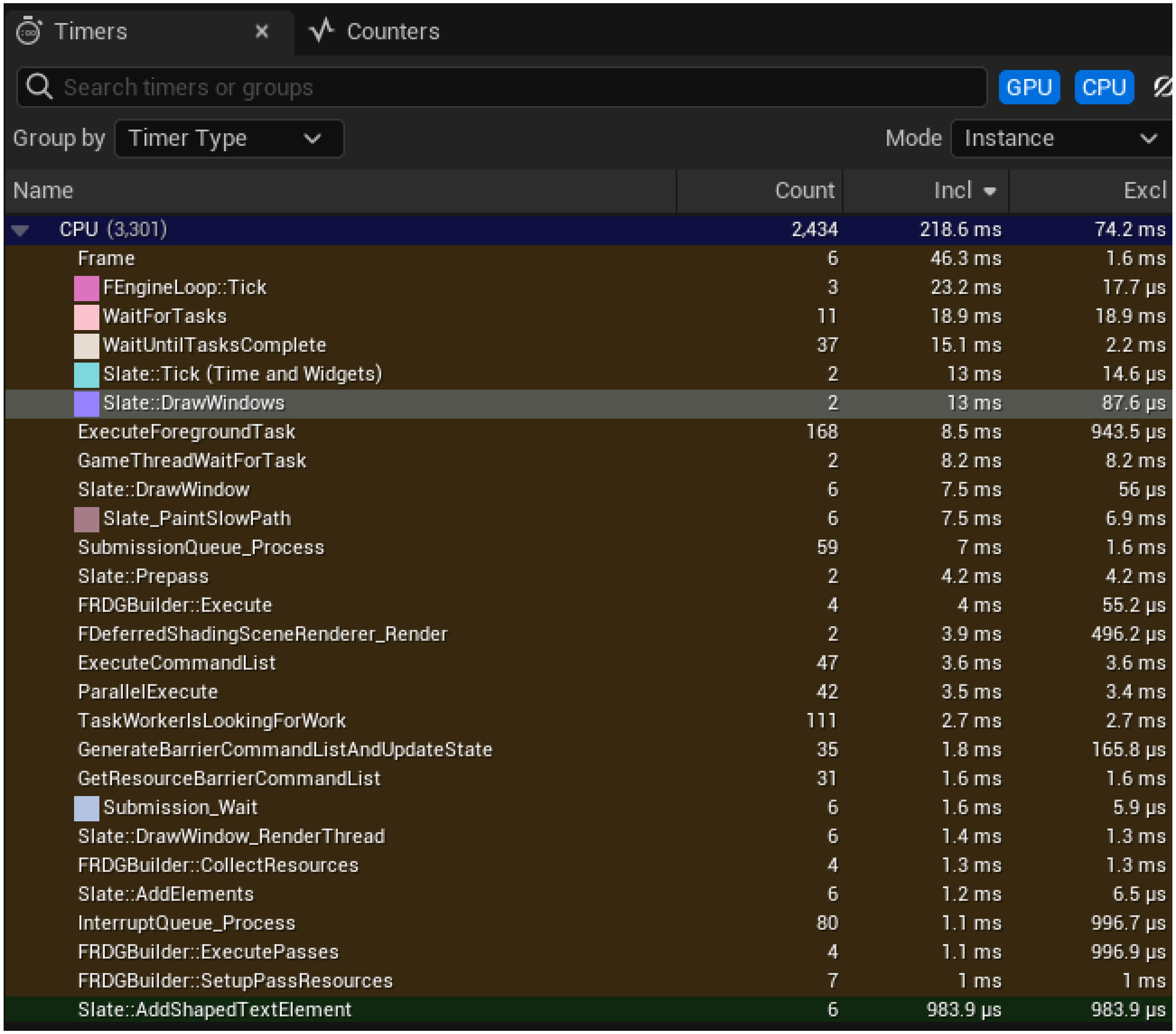
The **Timing panel** shows a detailed view of CPU/GPU usage organized into separate tracks for each thread. Each track represents a processing thread and displays a timeline of events. The width of each event indicates how much time the thread spent processing it.



For more information, see the Timing Panel page.

Timers and Counters

The **Timers** panel lists all timer events that run within the time range designated in the Timing panel (see above). In addition to grouped data based on time range, the list can be sorted in ascending or descending order by the values in any active column.



Group by Timer Type

Mode Instance

Name	Count	Incl ▾	Excl
▼ CPU (3,301)	2,434	218.6 ms	74.2 ms
Frame	6	46.3 ms	1.6 ms
■ FEngineLoop::Tick	3	23.2 ms	17.7 µs
■ WaitForTasks	11	18.9 ms	18.9 ms
■ WaitUntilTasksComplete	37	15.1 ms	2.2 ms
■ Slate::Tick (Time and Widgets)	2	13 ms	14.6 µs
■ Slate::DrawWindows	2	13 ms	87.6 µs
ExecuteForegroundTask	168	8.5 ms	943.5 µs
GameThreadWaitForTask	2	8.2 ms	8.2 ms
Slate::DrawWindow	6	7.5 ms	56 µs
■ Slate_PaintSlowPath	6	7.5 ms	6.9 ms
SubmissionQueue_Process	59	7 ms	1.6 ms
Slate::Prepass	2	4.2 ms	4.2 ms
FRDGBuilder::Execute	4	4 ms	55.2 µs
FDeferredShadingSceneRenderer_Render	2	3.9 ms	496.2 µs
ExecuteCommandList	47	3.6 ms	3.6 ms
ParallelExecute	42	3.5 ms	3.4 ms
TaskWorkerIsLookingForWork	111	2.7 ms	2.7 ms
GenerateBarrierCommandListAndUpdateState	35	1.8 ms	165.8 µs
GetResourceBarrierCommandList	31	1.6 ms	1.6 ms
■ Submission_Wait	6	1.6 ms	5.9 µs
Slate::DrawWindow_RenderThread	6	1.4 ms	1.3 ms
FRDGBuilder::CollectResources	4	1.3 ms	1.3 ms
Slate::AddElements	6	1.2 ms	6.5 µs
InterruptQueue_Process	80	1.1 ms	996.7 µs
FRDGBuilder::ExecutePasses	4	1.1 ms	996.9 µs
FRDGBuilder::SetupPassResources	7	1 ms	1 ms
Slate::AddShapedTextElement	6	983.9 µs	983.9 µs

Alternatively, you can view a list of events in the **Counters** panel, which lists all stats incremented during the same time period as the Timers panel.

For more information, see the Timers and Counters page.

Callers and Callees

When you select an event in the Timers or Counters panels, the **Callers** and **Callees** panels populate with a list of related functions.

- The Callers panel shows a list of all the functions that call the selected event.
- The Callees panel shows a list of all the functions that the selected event calls.

For more information, see the Callers and Callees section of the Timers and Counters page.

Log

The **Log** view displays all logs generated by calls to the macro `UE_LOG` from the Trace session. The logs can be filtered by **verbosity** and **category**, similar to the **Output Log** window in the Editor. For more information, see the Timing Insights Log page.

Quick Find Panel

The **Quick Find** widget is used to search and filter events displayed in the Timing view. The widget can be opened from the Timing view context menu by right-clicking on a **Timing event** or by using the **CTRL** + **F** shortcut when the Timing view has focus. You can then build a series of filters to find the events you're looking for.

The quick find panel with several filters active.

For more information, see the Quick Find Panel page.

Special Trace Channels

Some workflows in Timing Insights are not enabled by default. To use them, you need to run your application or the editor with specific trace channels active in your command line parameters. You can add these channels in the `-trace=` parameter. For example, the following command would run `MyGame.exe` with the default, Context Switch, and Task channels active:

Command Line

```
`MyGame.exe -trace=default,ContextSwitch,Task -tracehost=127.0.0.1`
```

Copy full snippet

> Make sure to run your command line with administrator privileges to ensure that these trace channels take effect.

When you open a trace session with these channels active, additional display options will be available to examine their relevant information.

Workflow	Trace Channel Name	Description
Context Switches	`ContextSwitch`	Provides additional display options for CPU and GPU Core tracks, including options for displaying CPU context switches. See [Context Switches](#) for more information.
Tasks	`Task`	Records and views data for Tasks. Timing Insights provides options for tracing the execution path of Tasks, including their prerequisite tasks and subsequent tasks, when this

Workflow	Trace Channel Name	Description
		channel is active. See Task Graph Insights for more information.