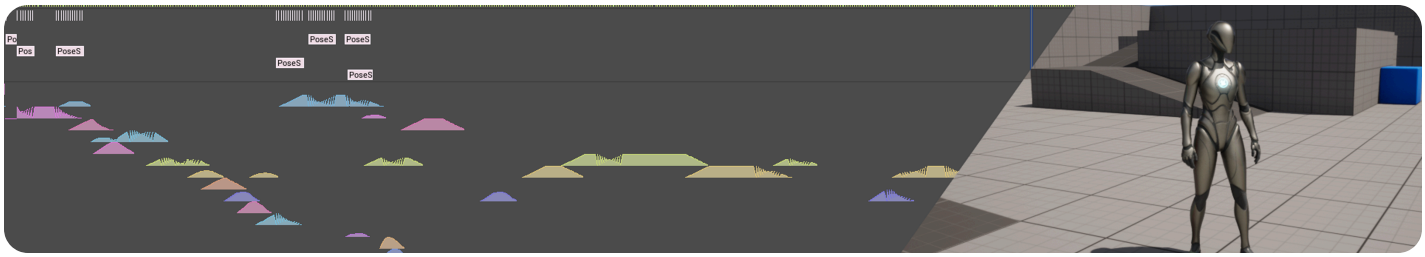
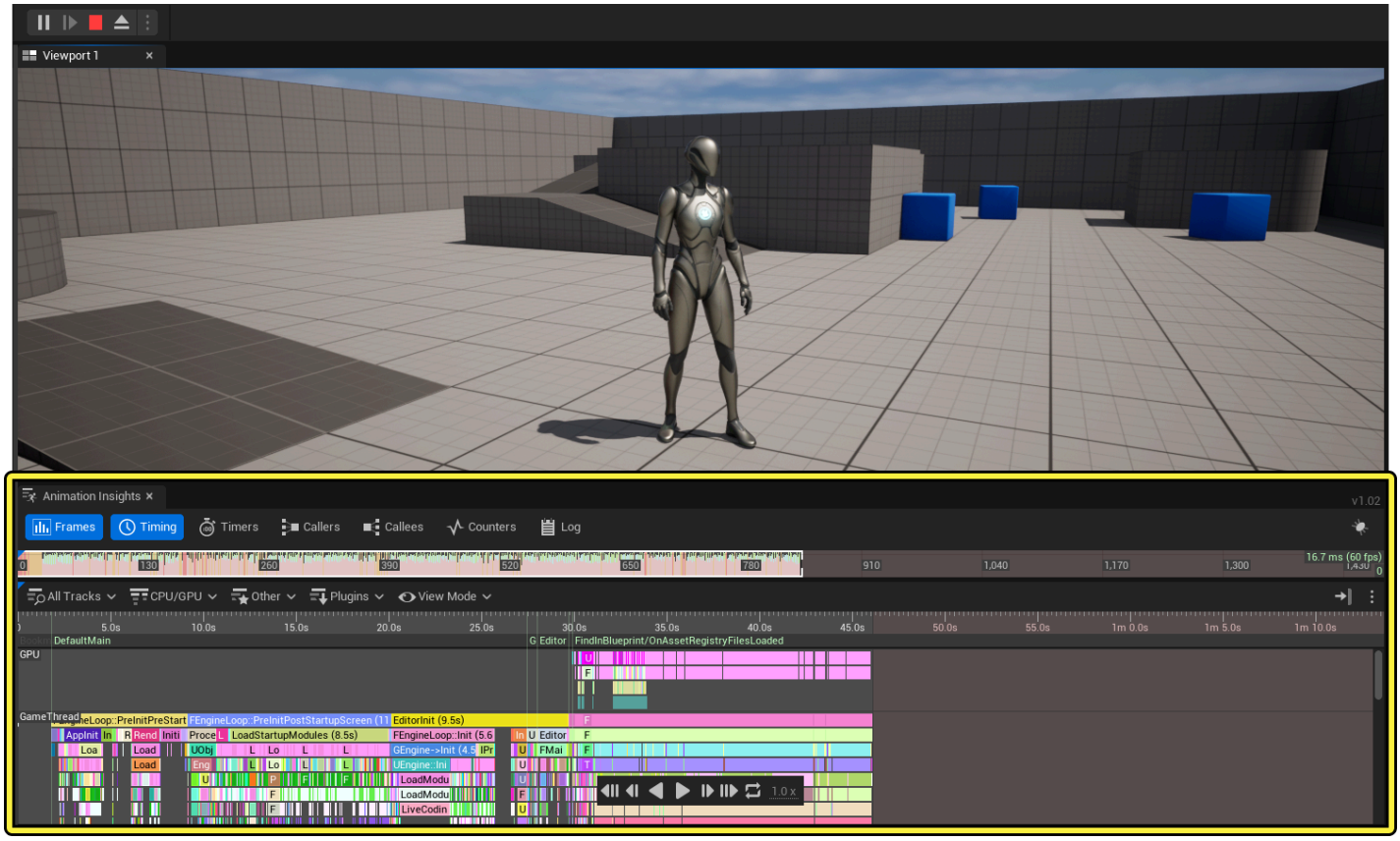
Animation Insights

Use the Animation Insights to observe and profile your project's gameplay and animation performance during runtime.



Animation Insights is a Plugin for **Unreal Engine** that you can use to profile and observe your project's gameplay and animation systems' performance in real time, using visually rendered trace data. By recording trace information during **PIE** (**Play in Editor**) simulation, you can monitor your project's performance bottlenecks, in relation to frame rate targets, in order to find optimization opportunities.



The Animation Insights plugin contains a performance graph that you can use to observe gameplay and animation system performance, in addition to animation states and live behavior updates, such as variable and blend values over time. By tracing your project's data, Animation Insights will track changes in data values, and plot that information into color coded tracks, which you can use to debug and optimize your project.

You can enable trace recording, to observe changes in your project's data, for the following data types:

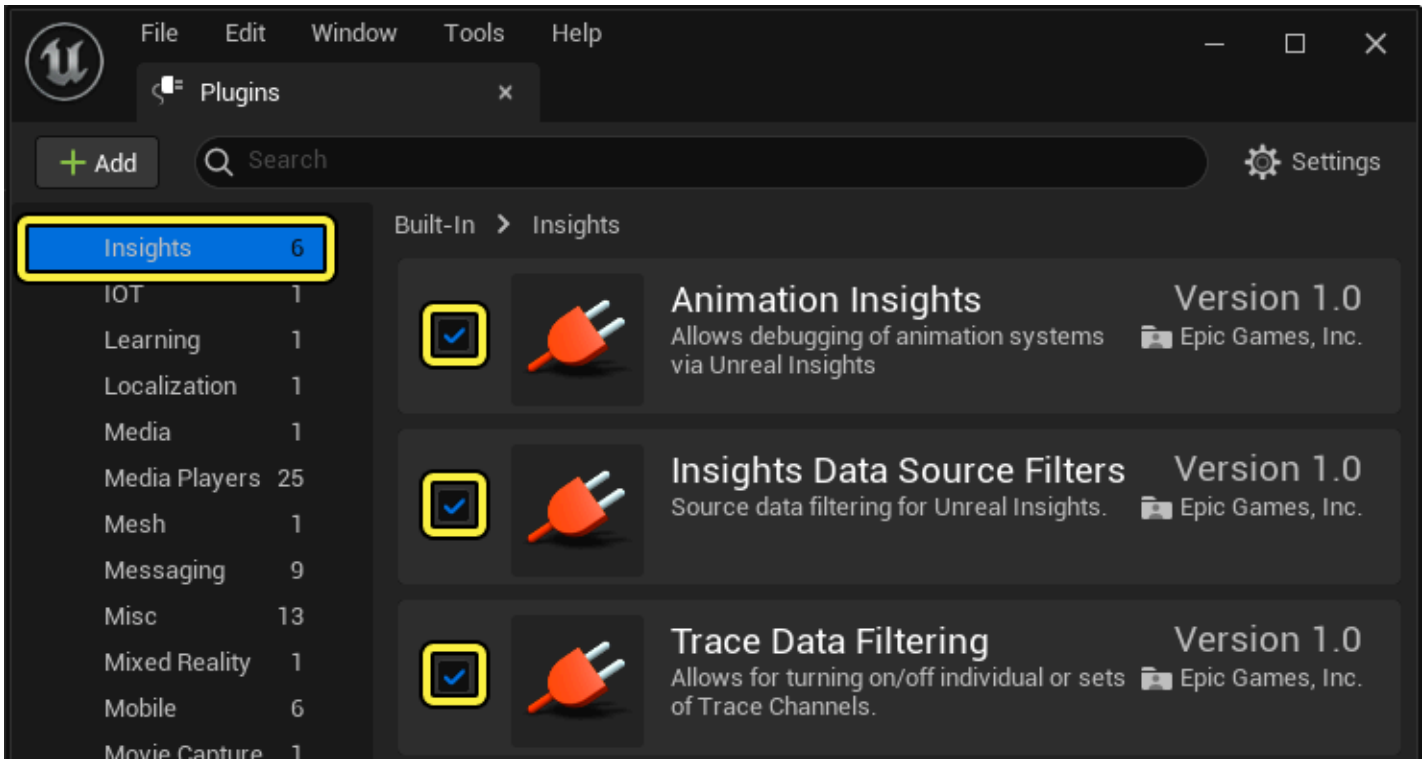
- Animation **Poses**, Curves, **Blend Weights**, Montages, Anim Notifies as well as a schematic Anim Graph view with a live update that replaces the `showdebug animation` system.

Using Trace Data Filtering you can select the specific trace data types written out to the recorded data set. You can also select the individual gameplay objects that output trace data using Source Filtering.

Prerequisites

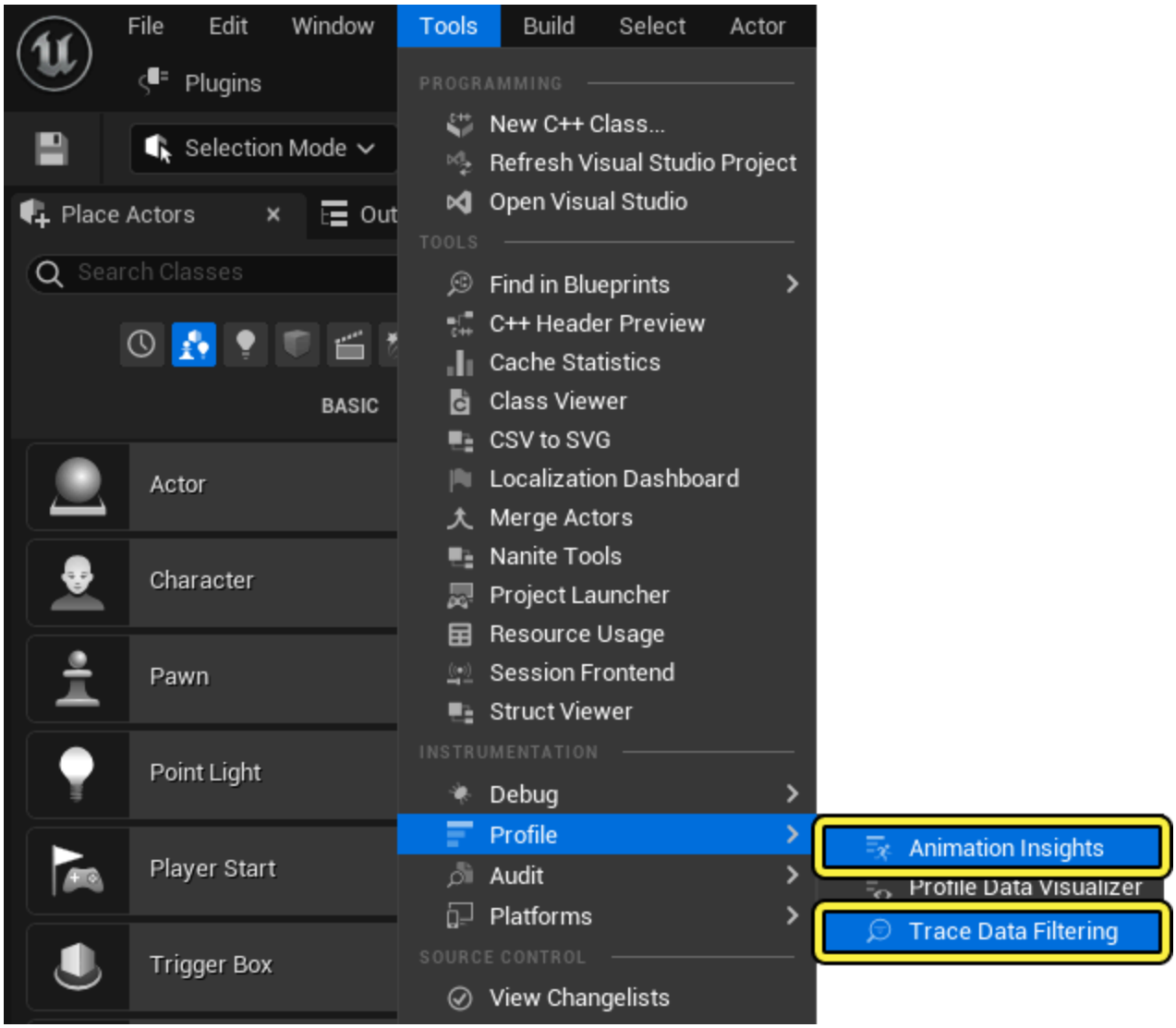
- Enable the following Plugins. Navigate in the **Menu Bar** to **Edit > Plugins** and locate the **Animation Insights**, **Insights Data Source Filters**, and **Trace Data Filtering** plugins, listed

under the **Insights** section, or by using the **Search Bar**. Enable the Plugin and restart the editor.

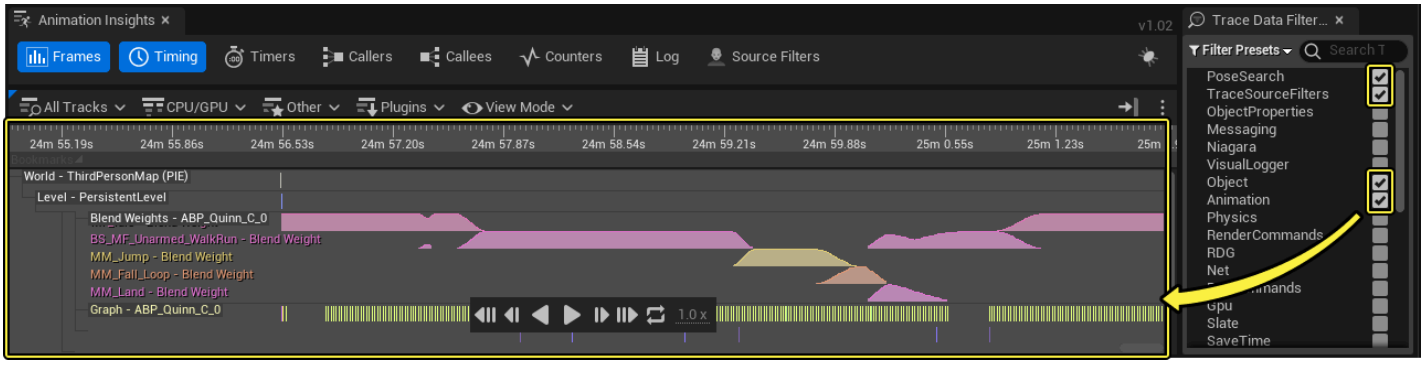


Using Animation Insights

After installing the plugins, open the **Animation Insights** and **Trace Data Filtering** panels. Navigate in the **Menu Bar** to **Tools** > **Profile** and select both the **Animation Insights** and **Trace Data Filtering** options.



You can enable **Trace Channel Filters** in the **Trace Data Filtering** panel, which will then populate the **Animation Insights** panel's graph with corresponding data in realtime.



Animation Insights stores this data in `.utrace` files in your computer's application data, you can access these trace files using the Unreal Insights Application, which you can launch alongside your editor by navigating in the **Menu Bar** to **Tools** > **Launch Unreal Insights**.

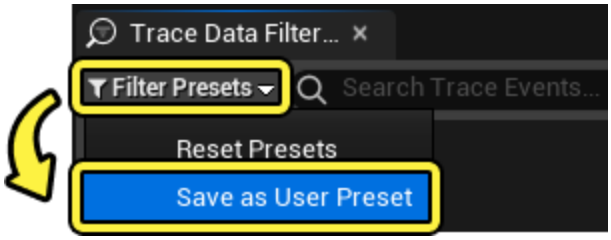
It is important to ensure animation traces are not left enabled beyond your debugging or optimization needs as the .utrace files can become very large.

Trace Data Filtering

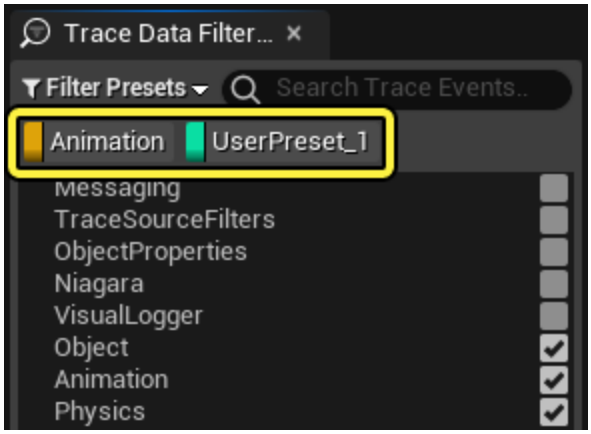
After opening the Trace Data Filtering panel, you can toggle Trace Channel states individually to record or ignore select data types in real time. These selections are then tracked and recorded in the Animation Insights panel during and outside of PIE and rendered as a graph that you can use to observe changes in data over time.

It is important to be selective about the amount of channels you enable, and how long they are left enabled. Selective channel filtering will limit the amount of performance overhead for your project, and the size of the stored `.utrace` files to save your computer's disk space.

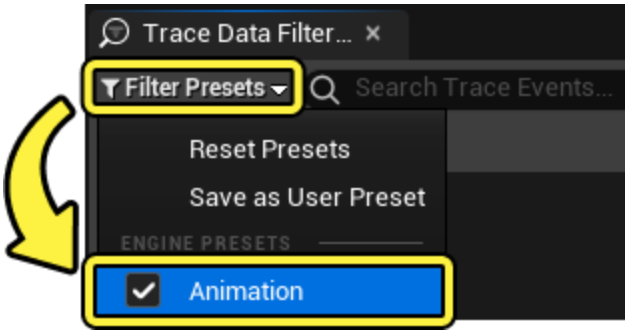
After making Trace Channel selections, you can save the combination of selection as a Filter Preset, by selecting the **Filter Preset** drop down menu, and selecting **Save User Preset**.



After enabling a **Preset**, you can quickly toggle enabled presets using the **Preset Buttons** in the Trace Channel list's header.



By default there is a pre-set **Animation** filter that enables the most relevant Trace Channels for tracking animation data in your project. The Animation preset filter includes **Object**, **Animation** and **Frame** tracking. You can enable the Animation preset filter by selecting the **Filter Preset** drop down menu, and selecting **Animation**.



For more information about tracing data types for debugging and optimization workflows, see the Unreal Insights documentation.

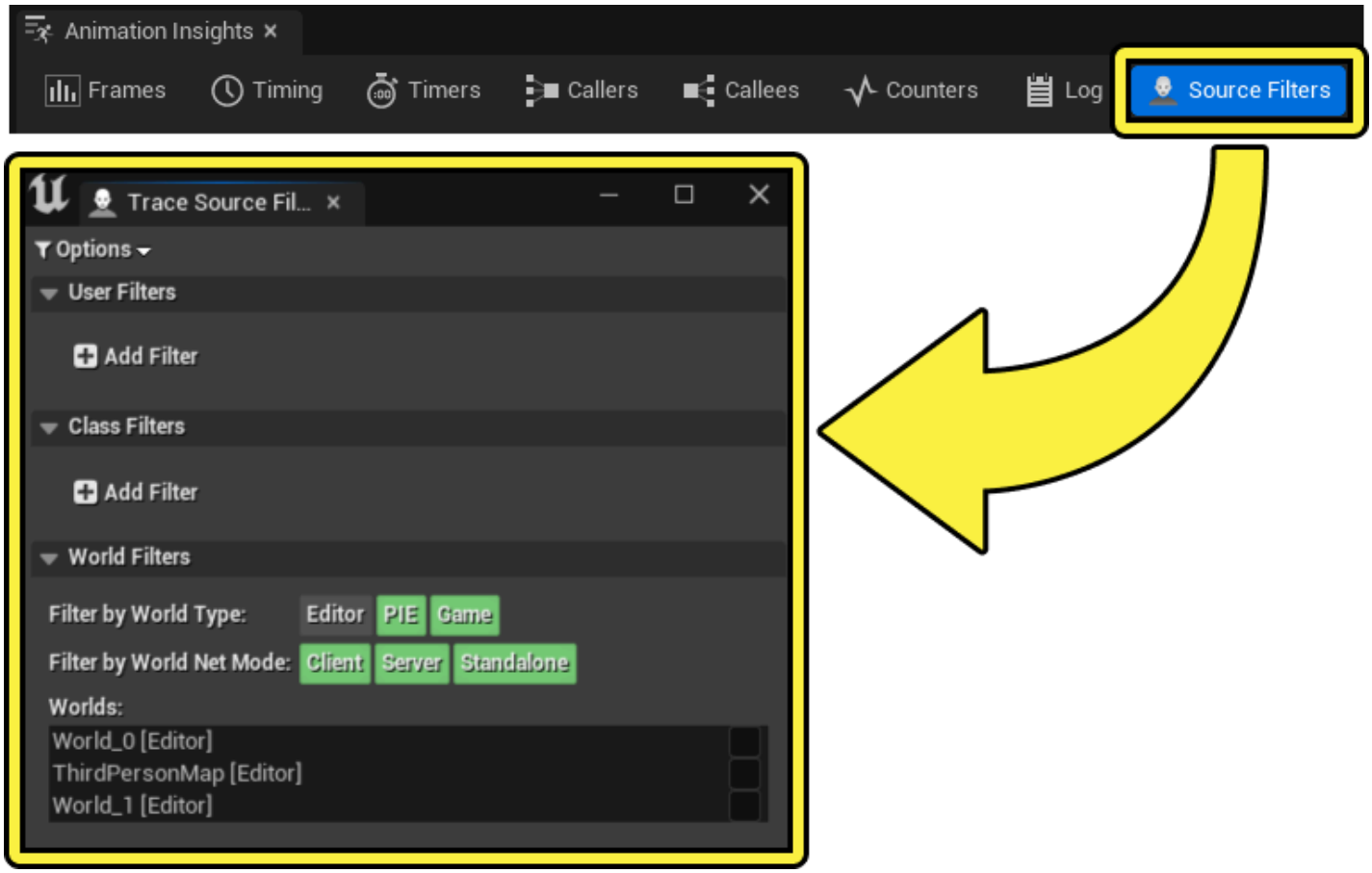
Unreal Insights

Profile your project's performance with Unreal Insights.

Trace Source Filtering

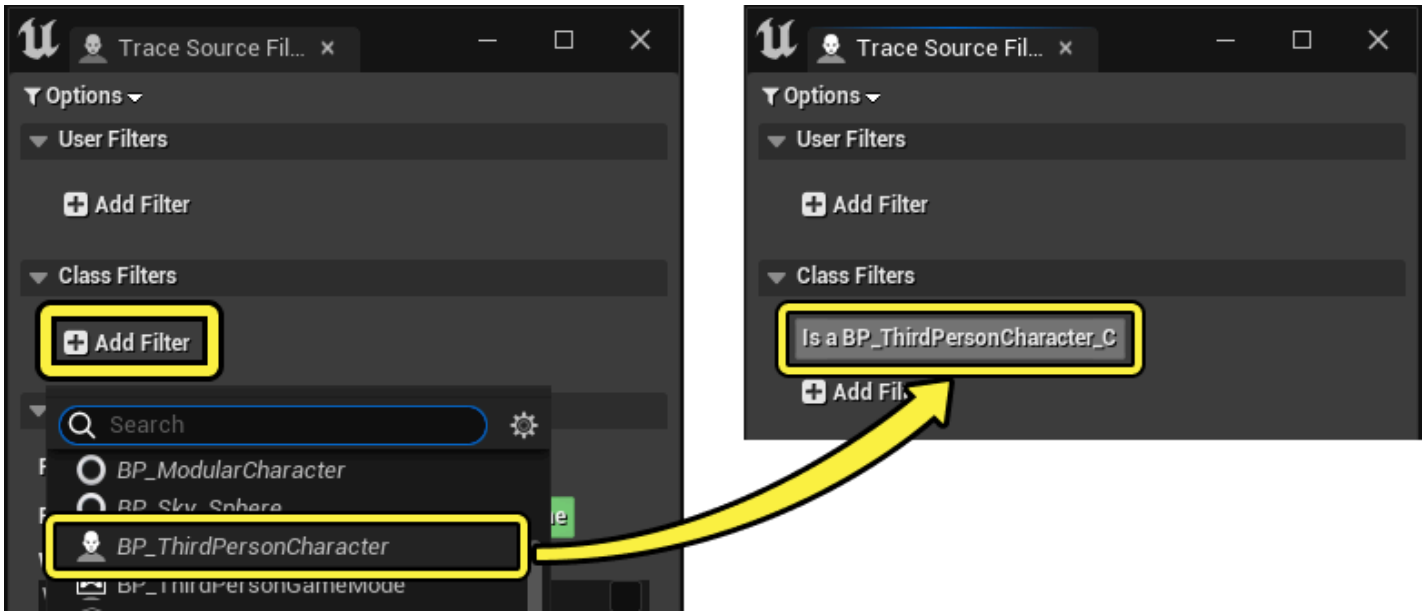
You can use Trace Source filtering to toggle the gameplay objects that can output trace data. This can be especially helpful when debugging or profiling a large-scale project, with a large number of **Actors** and **Components** in a given Level at once. With Trace Source filtering you can select which actors and components you want to record trace data, organize the output information, limiting the performance overhead, and reducing the amount of logged data to save your computer's disk space.

To open the **Trace Source Filter** window, select the **Source Filter** button in the Animation Insight panel's toolbar.

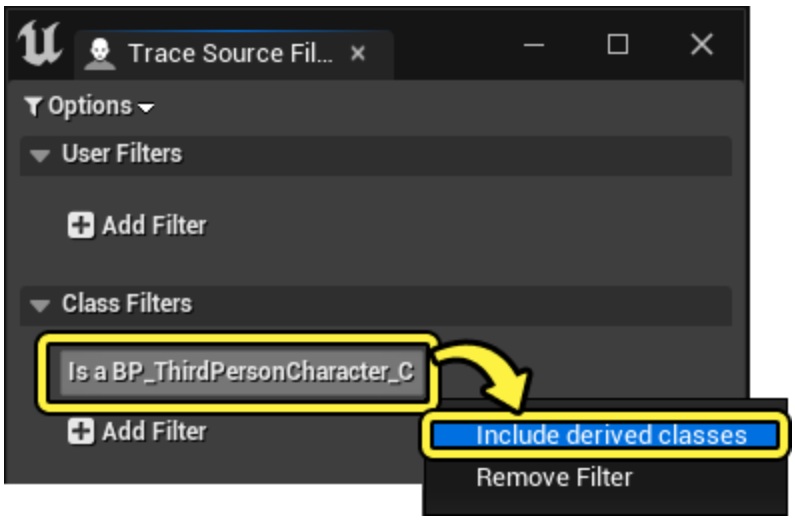


Class Filters

In the **Class Filters** section of the Trace Source Filtering panel, you can create filters based on your project's **Blueprint Classes**, to limit trace recording to only the enabled filter selection. To create a new Class Filter, select (**+**) **Add Filter** in the Class Filters section. Then select the blueprint or game object you want to record trace data from. The filter will now appear in the Class Filters section.



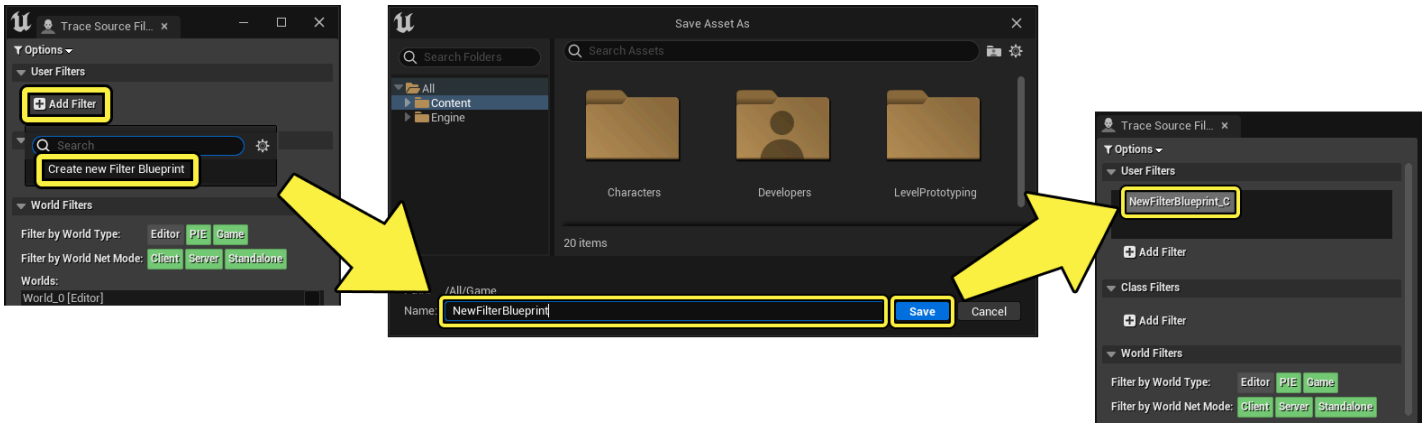
After creating a filter, you can optionally enable the filter to record trace data for all other game objects that are derived from the original game object or blueprint, by left-clicking the filter and selecting **Include derived classes**.



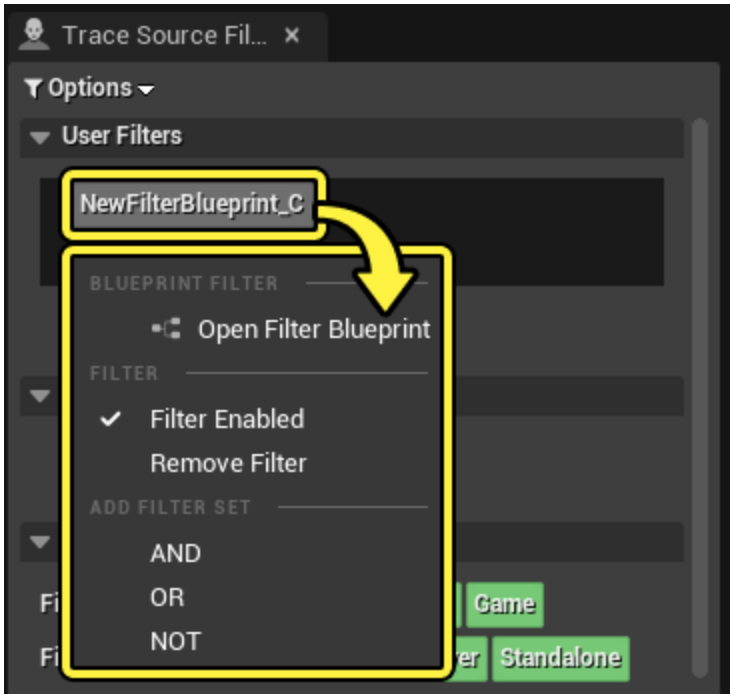
You can also select **Remove Filter** to delete the filter.

User Filters

You can also create your own custom filter blueprints to record trace data. In the **User Filters** section, select (**+**) **Add Filter**, and navigate in your project's file structure to the location you wish to save the blueprint. Assign the new blueprint a **name** and select **Save**. A new blueprint will be created that you can use to build custom trace collection logic.



After creating a custom source filter blueprint, in the **Trace Source Filters** panel's **User Filters** section, you can **right-click** the filter to bring up a context menu to define how the filter is used to record trace data.



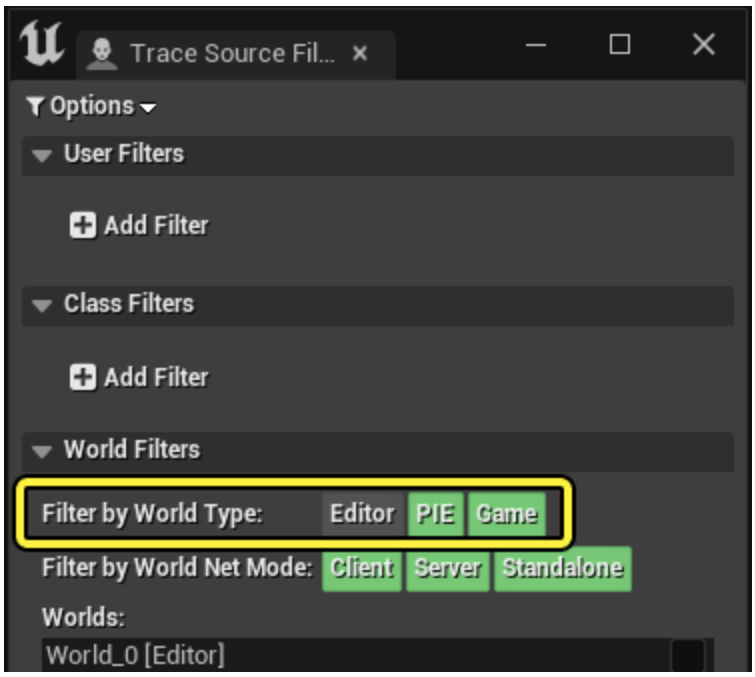
Here you can reference a list of the context menu option and a description of their functionality:

Option	Description
Open Filter Blueprint	Opens the custom filter blueprint in the **Blueprint Editor**.
Filter Enabled	Toggle the filter's functionality when filtering recorded trace data from your project.

Option	Description
Remove Filter	**Delete** the currently selected custom source filter from the **Trace Source Filter** panel.
AND	Set the custom filter to operate in **addition** to any other **User Filters**.
OR	Set the custom filter to operate **instead** of other present **User Filters**.
NOT	Set the filter to **exclude** trace recording for objects tracked using the custom filter.

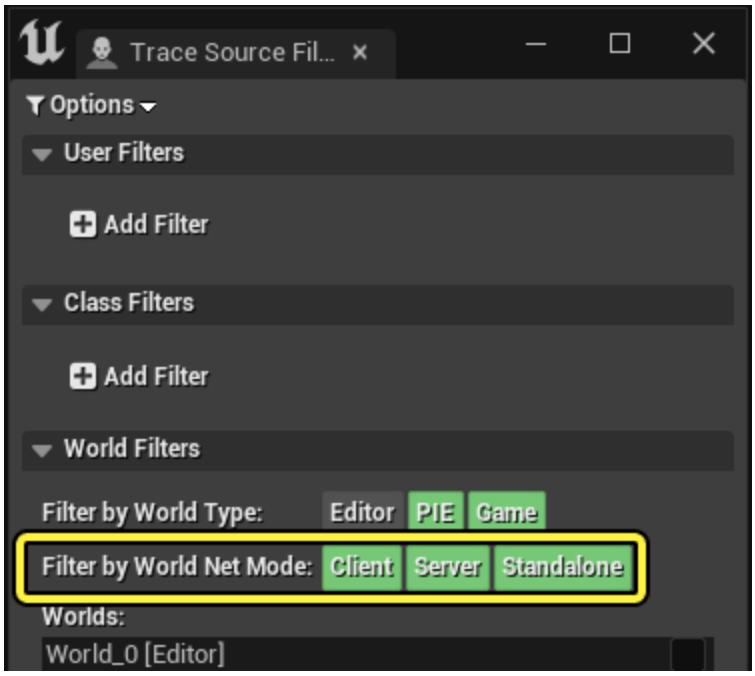
World Filters

You can set the context of trace recording on the different levels of your project using the **World Filter** section. You can toggle trace recording to occur during your project's **PIE** (**Play in Editor**) simulation, during actual game operation, and within the context of the editor. You can toggle the trace reccroding with each of these contexts using the buttons adjacent to the **Filter By World Type** property.



You can also control the trace recording that occurs during network operations for multiplayer and network based projects. Using the **Filter by World Net Mode** property, you can enable

trace recording for the filtered sources, by **Client**, **Server**, and **Standalone** renders of the project.

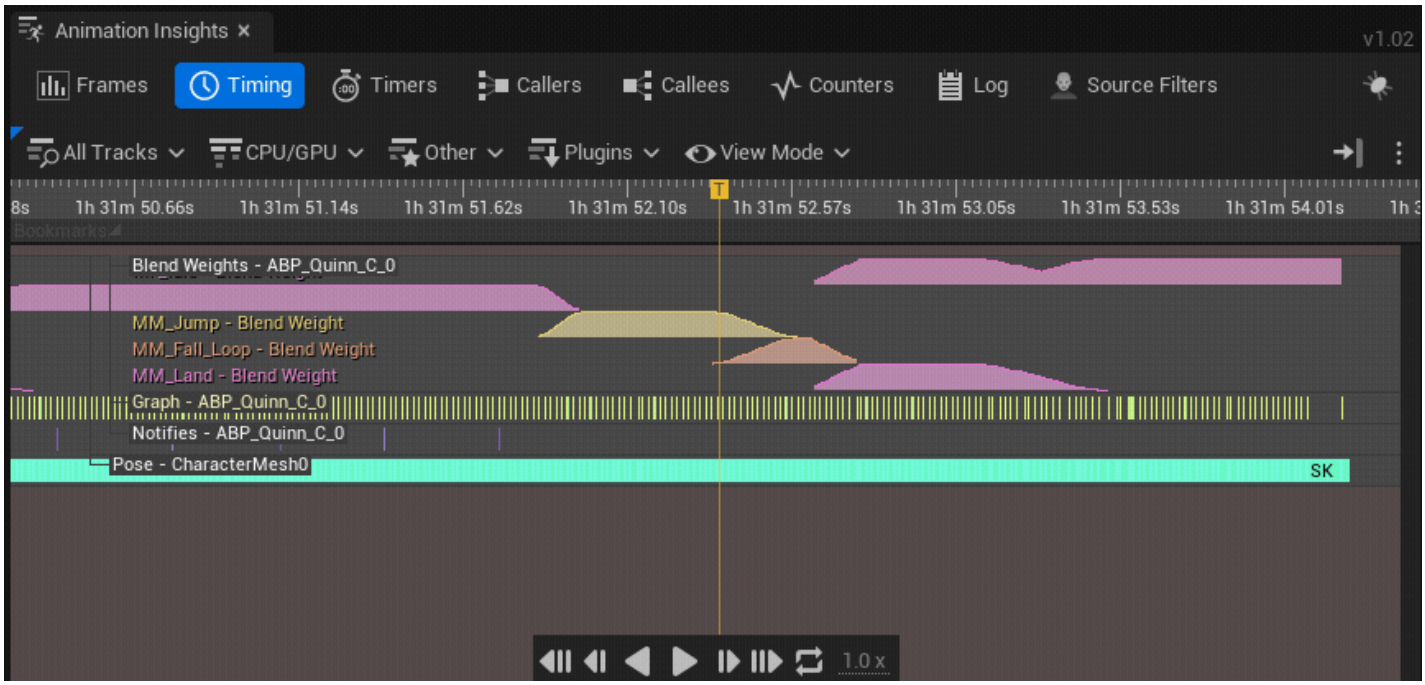


For more information about Trace Recording World Filters in Unreal Engine, see the Channel Filtering documentation.

Using Animation Insights

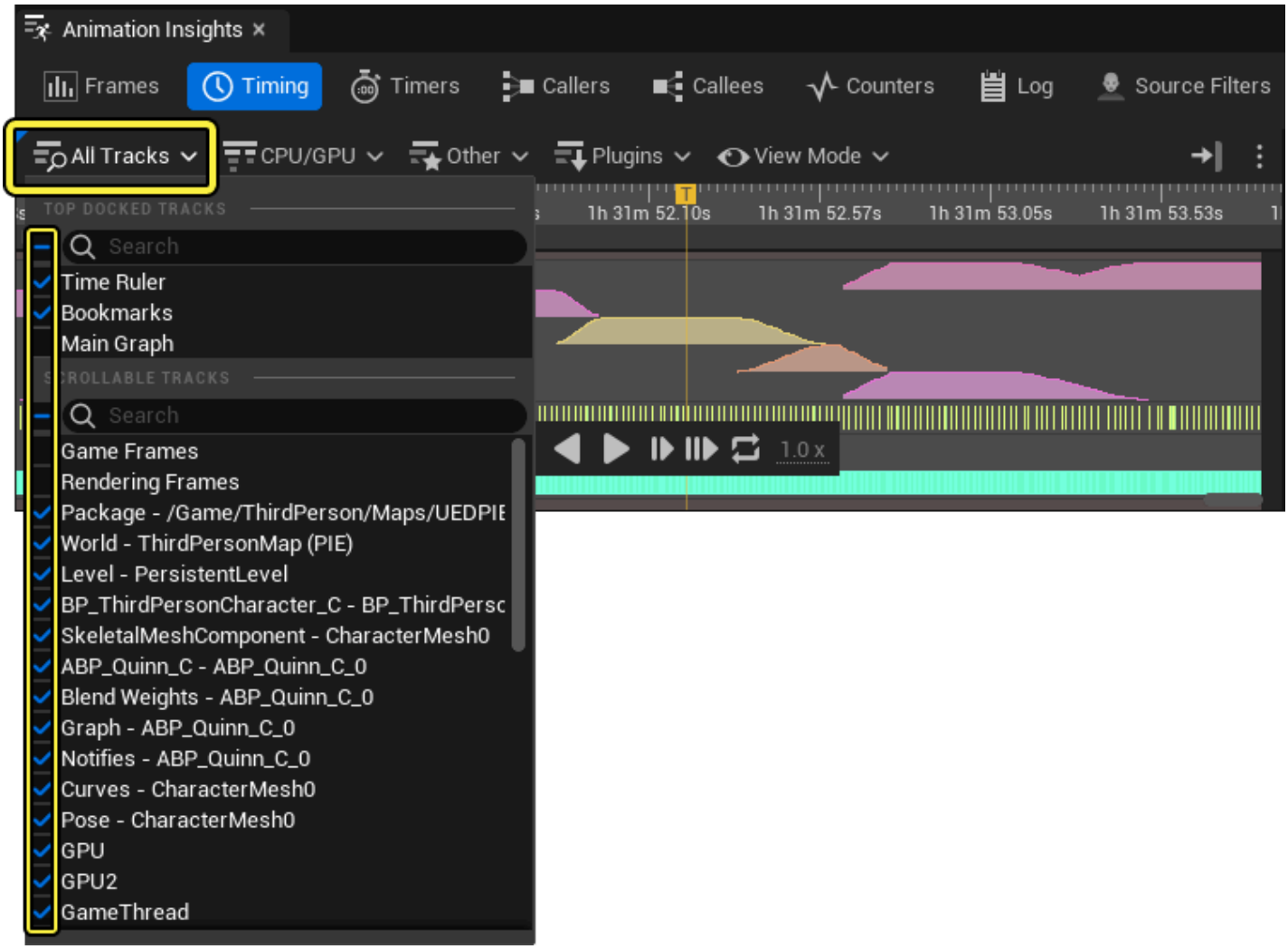
Animation Insights expands on the pre-existing `showdebug` animation feature, which displays internal animation runtime data. The ability to visualize and analyze the information enables users to locate and identify potential sources of animation irregularities or improper performance behaviors.

The default, `showdebug` animation feature can be limiting, because the `showdebug` animation system only outputs text logs to the screen. With Animation Insights, users can record the frame ranges containing undesirable animation system behavior while being able to play back the recorded section of animation or gameplay while reviewing the logged data.



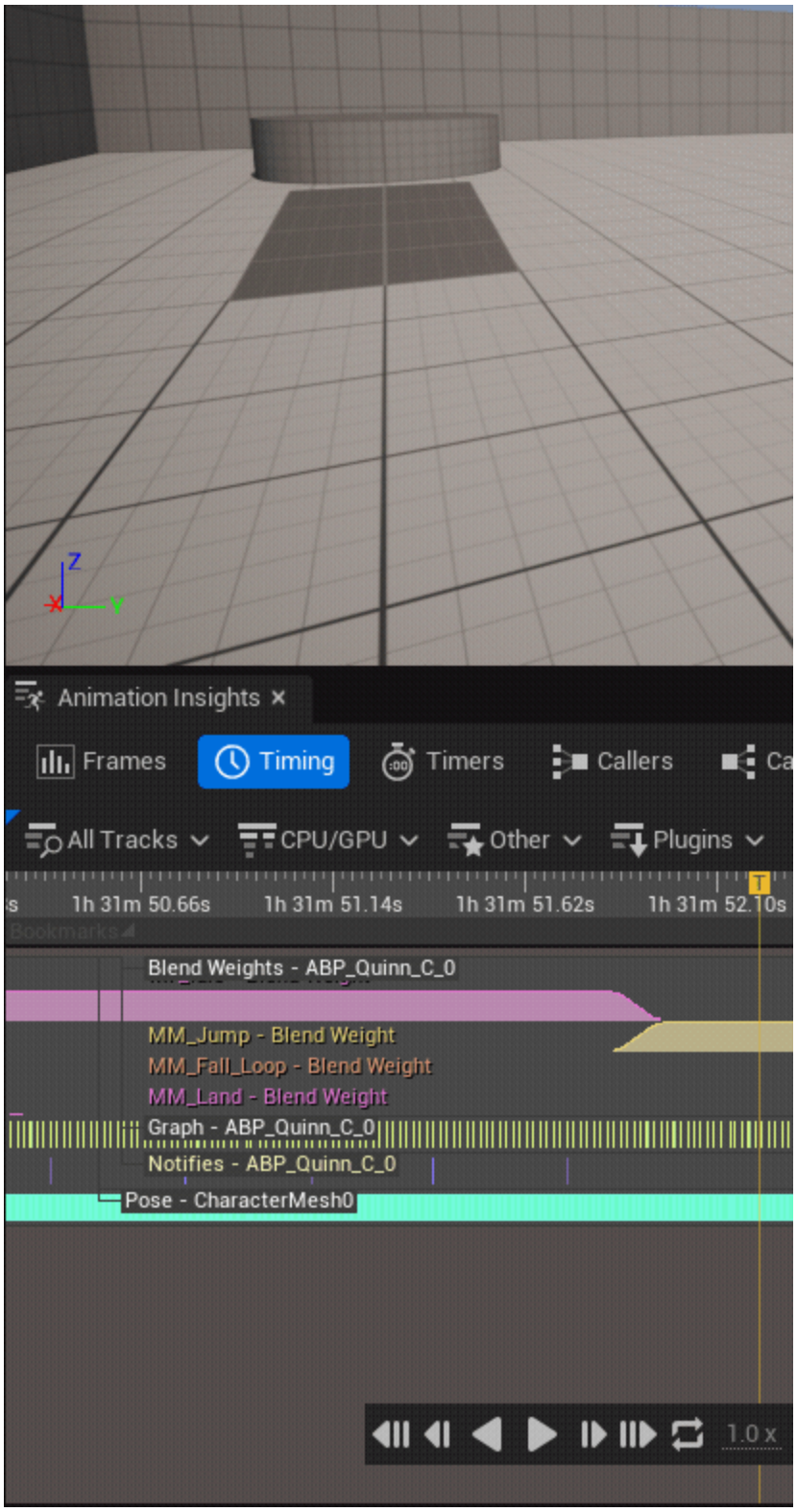
After enabling an array of Trace Source Filters, you can run your project to record the animation data changes over time. The data is organized into Tracks which are layered horizontally in the Animation Insights panel's timeline. Each track displays a unique set of data, and only are present when the corresponding Trace Source Filters are enabled.

You can toggle each track's visibility using the All Tracks button in the Animation Insights toolbar menu.



Track Inspection

You can view the data in each track over time visually using the Animation Insights graph. Tracks can also display numerical data by inspecting the track. Each track contains different data, so each track's inspection is contextual to the data type the track is monitoring. You can expand the data contained within a track by right-clicking the track title on the left side of each track, and selecting the expansion options available in the context menu.



When selecting an expansion option, such as **View Properties** or **View this Graph**, an auxiliary panel will open that contains the tracks data, at the point in time the Animation Insights timeline's playhead is occupying.

Track Types

Each Animation Insights data track contains relevant and contextual data for the data type it contains, as well as relevant data expansion options and properties.

Here you can reference a list of common Animation Insights tracks and a description of the data they contain:

Track Name	Description
Notifies	**Notifies Tracks** display the presence and state of **Animation Notifies** and **Sync Markers** contained in the traced character's animations. The topmost lane of the track displays the per-frame events, such as animation ticks, notify events such as audio queues and effects, as well as sync markers. Other lanes display the active notify states. You can **right-click** the track and select **View Properties** to display the notifies that are active on the current frame.
Curves	**Curves Tracks** display all animation curves that were active in the current frame. You can **right-click** the track and select **View Properties** to see an expanded log of the curve values that were active at the selected frame.
Pose	**Pose Tracks** show or hide active Actor poses at the selected frame. You can **right-click** the track to enable a debug drawing of the **poses** or **skeleton** during the selected frame.
Graph	**Graph Tracks** show when the traced graph updates, indicated with vertical bars at the corresponding time intervals. You can **right-click** the track and select **Debug this Graph** to open the **Animation Blueprint debugger** panel and connect it to the track. With the Animation Blueprint debugger open, you can scrub the timeline to view the graph's data update in corresponding point in time. The Animation Blueprint Debugger panel includes pose link weight, state machine state, asset player position and blendspace sample data. Select **View this graph** to see a schematic tree view of the animation graph.
Montage	**Montage Tracks** show animation **Montage asset** information over time, including **blend weights** as well as **section** states and transition data.
Blend Weights	**Blend Weights Tracks** show all the assets that were active in a frame and their effective blend weights. You can **right-click** in the track to go to the

Track Name	Description
	node in the Animation Blueprint that the graph corresponds to at the selected frame. You can also view other track data such as playback time or blendspace coordinates.

Animation Insights Control Reference

Here you can reference a list of hotkeys and shortcuts you can use when working within the Animation Insights panel to observe animation debug data.

Input Shortcut	Function
Ctrl + **Left Mouse Button**	Scrubs the **Time Ruler** in the graph header, to control the current time, allowing values to be evaluated in schematic views, poses to animate in the viewport, and more over time.
G	Toggles the **Graph**'s visibility.
V	Auto-hides all tracks that have no timing events in the current Viewport.
I	Togglesthe **I/O** (**File Input**) **Overview** and **Activity Track**'s visibility.
L	Toggles the **Asset Loading Track**'s visibility.
Y	Toggles the **GPU Track**'s visibility.
U	Toggles the **CPU Thread** (and all CPU thread group) **Track**'s visibility.
R	Toggles the **Frame Track**'s visibility.