



Introducing Maya 2020

With a focus on empowering artists throughout the production pipeline, Maya 2020 introduces new tools and updates that not only help animators, modelers, riggers, and technical artists work faster and more intuitively, but also make the creative process more fun.

- **60+ animation features:** Building on powerful animation features introduced in Maya 2019, this release adds over 60 new animation features and updates that animators will notice in their day-to-day work.
- **Cached Playback:** New preview modes and efficient caching of image planes and dynamics gives animators faster animation playback and more predictable results.
- **Animation bookmarks:** Artists can mark, navigate through, and organize specific events in time as well as frame playback ranges.
- **Arnold GPU:** Maya 2020 includes Arnold 6 which can now be used for production rendering on both CPU and GPU.
- **Bifrost for Maya:** Significant performance improvements, Cached Playback support, and a new MPM cloth constraint compound bring even more power to the visual programming environment in Maya.
- **Viewport improvements:** The Maya Viewport has been improved to make more efficient use of hardware, resulting in a smoother overall experience.
- **Modeling features:** New Remesh and Retopologize features help modelers spend less time cleaning up their models and more time modeling.
- **Rigging improvements:** Updates including matrix-driven workflows and a new wrap deformer make the work of riggers and character TDs easier.

Animation in Maya

Animation has always been a core strength for Maya, and it's getting better with each release. A major focus on making animation workflows faster and more creatively engaging for artists

has helped set the foundation for Maya as a go-to solution for creating believable, life-like character movement. Maya 2020 builds on powerful animation features introduced in Maya 2019 with over 60 new animation features and updates to Cached Playback, the Graph Editor, and the Time Slider.

Cached Playback

First introduced with Maya 2019, Cached Playback is a background process which helps increase the speed of animation playback in the viewport. This enables artists to evaluate iterations of their animation right in the viewport, rather than producing multiple playblasts – which can be both time consuming and creatively frustrating.

Cached Playback continuously evaluates a scene, calculating changes in the background while the artist animates and caching the scene to memory. When the artist makes changes, Maya intelligently only re-caches the affected frames. Then, when they hit play, Maya plays the scene back at a higher framerate since the frames are already cached.

The latest updates to Cached Playback bring even more speed to animator workflows:

- **Layered dynamics caching:** New layered dynamics caching separates background processing of dynamics (effects) and the core animation within a scene. With dynamics caching on a secondary layer, artists are able to continue working and see simulations like cloth and muscles running in real-time as they animate.
- **Upgraded image planes caching:** A popular request by users, image planes are now cached the same way as animations through Cached Playback. If a scene has a sequence of images applied onto an image plane, rather than loading the images during playback, Maya now stores the images directly in the evaluation cache, allowing for much faster playback.
- **Improved Smooth Mesh Preview support:** Smooth Mesh Preview now uses less memory and runs previews on the GPU when possible. This is especially useful when working with dense, asset-heavy scenes where memory limits can be reached quickly.
- **Extended API support for custom plugins:** Technical users can now set custom configurations for the nodes they build, reducing the burden on artists to enable out-of-the-box Cached Playback support for custom plugins. Different configurations and presets can be written to take full advantage of the flexibility of Cached Playback, allowing artists to prioritize what gets cached and what should be ignored to further increase performance.
- **New Ghosting Preview:** The new Ghosting preview feature allows animators to see the appearance of past and future movement. This is useful when actively working on a scene that requires nuanced action. Traditional animators would often flip their paper to see animation in motion and this is meant to help in a similar way. Seeing animation across frames helps understand motion and more easily see arcs and lines of action. When using this feature, a select few frames are visible. Control of frame appearance can also be adjusted as needed through available options.

Animation Bookmarks

Artists can use new Animation bookmarks to mark, navigate through, and organize specific events in time as well as frame playback ranges in the Maya Time Slider. Artists can select start and end frames and assign different colors to bookmarks to easily identify them. Hovering over a bookmark clearly highlights the time it occupies in the Time Slider.

Audio Features

A new audio volume control on the Time Slider makes it easier for users to adjust audio while multi-tasking. For example, this is useful if a user is working in Maya and listening to music or an online course at the same time. Several new audio features also help manage audio clips:

- **Delete sounds:** This new sub-menu makes it possible to delete existing sounds in a scene right from the timeline.
- **Waveform display settings:** The preference to switch the waveform display view between “top” (drawn from the top of the timeline down), “bottom” (drawn from the bottom of the timeline up), and “centered” (drawn in the middle of the timeline) is now accessible right from the audio menu.
- **Sounds shown in outliner:** When dealing with scenes that have many sound files, it can be difficult to manage all of the different sounds through the audio and delete menus. To address this, sound nodes are now always visible in the outliner, allowing users to easily rename, delete, or mute them.

Tangent Mode Updates

It’s now easier to change the default tangent mode in the Graph Editor. Once the tangent style is changed, it’s clearly highlighted, and subsequent keys continue to use that mode. Artists are also able to adjust the default tangent weight and in/out tangents right in the Graph Editor rather than preferences, reducing the number of steps to make changes to settings.

Color Themes

Multiple color themes allow users to quickly pick between light, dark, and classic Graph Editor color themes, as well as themes that help with color vision deficiency. Users can also create their own themes and export them as scripts, so that they can be shared with others or saved for future use.

New Rivet Command

The new Rivet command in the Constrain menu provides a one-click solution for creating locators directly attached to a deforming mesh. Artists can quickly generate a locator by selecting a face, point, or UV in their scene.

New Hotkeys

A number of new hotkeys make it easier and faster for artists to navigate the UI and tackle certain tasks in Maya. Here are just a few examples:

- **MotionBuilder-like x-ray toggles:** The new **Alt + a** hotkey make it quicker for artists to cycle between x-ray modes to see joints, controls, and characters.
- **Keyframe tangent marking menu:** Available as **Shift + s**, the marking menu shows animators a variety of options for their keys and tangents.
- **Four new toggle visibility hotkeys:** Animators often turn on and off nurbs curves to show or hide controllers. Rather than using the menu, artists can now skip a step for the most popular actions:
 - Nurbs curves: Alt + 1
 - Polygon meshes: Alt + 2
 - Image planes: Alt + 4
 - Wireframe on shaded: Alt + 5
- **Nudging keys left and right:** New hotkeys make it possible for animators to nudge selected keys to the left or right easily:
 - To the left: Shift + 9
 - To the right: Shift + 0
- **Selecting previous and next keyframe:** Chosen to closely mimic scrubbing commands, new hotkeys speed up the task of selecting previous and next keyframes. While this function is already possible in the Graph Editor, the new keys work at a global level. Combining these hotkeys with the nudging workflow above can speed up your workflow and finessing.
 - Select preview keyframe: Ctrl + Alt + ,
 - Select next keyframe: Ctrl + Alt + .

Rendering in Maya

Arnold 6

Arnold 6 is included with Maya 2020 and can now be used for production rendering on both the CPU and GPU. With a single click, users can switch seamlessly between CPU and GPU rendering, empowering them to choose the type of rendering best suited to their specific needs and workflow. From real-time look development to interactive lighting, Arnold GPU brings speed and power to artist workflows, making it possible to work with near final quality renders at truly interactive rates. Artists can get immediate and more responsive feedback when tweaking shaders and adjusting lighting, giving them more time for artistic iterations.

Arnold 6 also adds support for hard creases in adaptive and multithreaded mode, multiple scattering between microfacets for rough dielectrics, improvements to the Physical Sky shader, better roughness mapping of the Oren-Nayar diffuse BRDF, improved rough thin-wall

transmissions in the standard surface shader, more accurate albedo AOVs, and a new AOV Write Vector shader.

New Standard Surface Shader

The new render-agnostic Standard Surface shader has fewer parameters to tweak and more artist-friendly, intuitive controls, improving the workflow for creating materials in Maya.

Light Editor Improvements

Improvements to the Light Editor make it easier to add, enable, and disable lights, adjust multiple lights simultaneously, and override light attributes in render layers. It's also now possible to export light groups as .json files to reuse in other scenes.

Render Setup Improvements

Several updates have been made to Render Setup to give artists more control over object shading, including the ability to override attributes such as color, position, and noise on each position marker of a ramp texture and export them as .json files to reuse in other scenes.

Serious Effects in Maya

Hot on the heels of the first release of Bifrost for Maya at SIGGRAPH 2019, the latest update (Bifrost 2.0.3.0) adds even more power to the new visual programming environment, including significant performance and stability improvements, support for Cached Playback, improved Arnold support, new simulation features, more pre-built graphs to help artists get started, and over 100 bug fixes driven by user feedback. On top of that, users can now share their own graphs and compounds back with the community on AREA.

- **Faster Bifrost:** Artists will notice up to 2x faster viewport performance when dealing with volumes. Bifrost graphs also make better use of DG evaluation rules in Maya, resulting in additional speed gains.
- **Cached Playback support:** Most Bifrost graphs (excluding simulation graphs) can now take advantage of Cached Playback.
- **Improved Arnold support:** Arnold now renders adaptive volumes created with Bifrost faster and supports Bifrost-instanced volumes.
- **MPM cloth constraints:** Constraining MPM cloth is much easier thanks to a new compound.
- **UNC path support:** It's now possible to load Bifrost (including any compounds) from UNC paths on Windows.
- **Improved user experience:** The parameter editor and welcome screen in the Graph Editor have both been revamped to be more visually pleasing and easier to navigate. In a single click, artists can open the Bifrost Browser, create a new graph, and access the Bifrost community hub on AREA.

- **Visual programming toolkit improvements:** New math nodes, array manipulation, and processing nodes are now available.
- **Bifcmd improvements:** Artists can now run Bifrost graphs, including those that rely on third party custom compounds, directly on the command line.
- **New pre-built graphs:** This update adds a number of new ready-to-use graphs to the Bifrost Browser to help artists get started, ranging from fire to cloth simulation.

Viewport Improvements

Faster Selection & Viewport Performance

It is now faster to interact with or select dense geometry or work with large numbers of smaller meshes in the viewport and UV editors. These changes result in a noticeable performance improvement that will help artists see preselection faster and navigate more easily. Other common scenarios like relying on Isolate Select have also been sped up.

New Modeling Features

Remesh

When working on an asset, modelers can quickly run out of manipulatable polys in regions of their mesh (For example, pulling horns out of a low-poly head). The new Remesh tool allows modelers to specify exactly where they need extra detail on their model by redefining the topology of any area on a mesh. With this update, modelers are also able to evenly re-triangulate the mesh at different densities, ensuring uniform distribution of faces.

Retopologize

When combined with Remesh, Retopologize is the perfect companion. While Remesh allows modelers to achieve the density they need for their mesh, Retopologize makes it quick and easy to clean up the mesh. Retopologize generates clean, new topology that preserves the original mesh shape while reconstructing the surface topology into evenly-distributed quads. The result is a deformable, production-friendly mesh that can continue moving down the pipeline. Artists can combine Remesh and Retopologize to spend less time cleaning up their models and more time modeling.

Dense meshes

Maya 2020 brings a performance boost to editing UVs in the UV Editor, particularly when working with dense meshes.

Rigging Improvements

New Matrix-driven workflows

New matrix-driven transform and operation nodes help artists drastically reduce node and connection clutter in their scenes, bringing them significant performance gains.

Improvements include:

- A new **Offset Parent Matrix** input attribute makes it possible to control transforms using a single connection, reducing scene complexity and evaluation time when compared with other methods of driving transformation values.
- The new **Matrix Widget** allows artists to directly edit matrix values (both raw and in a decomposed view) in the attribute editor. The process of manipulating transforms is now more intuitive, with common matrix operations available in a convenient right-click menu.
- The **Blend Matrix** node enables artists to combine the results of specific matrix operations.
- The **Pick Matrix** attribute makes it simple to filter and extract transformation matrix components.
- The **Aim Matrix** node allows artists to define constraint behavior such as aim and orientation through a separate attribute.

Pin to Geometry

New Proximity and UV Pin nodes can be used to precisely track positions on deforming geometry. These nodes are especially useful for tasks like adding a prop to a character, such as sticking a button on a shirt, or setting up a simple constraint rig.

New Proximity Wrap deformer

The new GPU-accelerated Proximity Wrap deformer brings better memory use and a significant performance boost to artist workflows, making it easier to achieve smooth results.