Vortex Studio 2018b
Release Notes

WHAT'S NEW

Welcome to the second Vortex Studio release of 2018! We keep working on the interface of the software to make it more powerful and ever easier to use. New features and improvements have also been added, as well as general performance increases.

To better showcase that it delivers a complete next-generation simulation development environment, Vortex Dynamics was renamed Vortex Studio in 2017, with version numbering replaced by year of release to simplify maintenance. It features a slick, easy-to-use interface, streamlined content design workflow, and built-in functionalities that reduce system integration time.

Vortex Studio Platform

Many new additions have been made to the core platform, including:

General Enhancements

There have been many changes to improve the general performance and usability of the software:

- The **performance of the dynamics module** has been improved, allowing more physical objects to be modelled within a scene. See the *Dynamics Module* section for more details.
    - Selective wake-up
    - Relative sleeping
- Vortex Studio now supports the **Microsoft Visual Studio 2015 (VC14) C++ compiler** (see the *Systems Requirements* section).
    - Support for the older VC10 version will be fully deprecated later this year; its installers are only available on demand through support
- Numerous upgrades have been made to the SpeedTree implementation. These will be made available by installing the most recent **Vortex Tree Library**.
    - Improved anti-aliasing on leaves and branches
    - Improved ambient occlusion effects
    - Vegetation can now react to wind
- The Vortex Studio applications (Editor, Player and Director) can now use **Unicode characters** (Chinese, for example) in all files and folder names.
- The network deserialization performance has been improved.
- Viewport mapping extension can now be used to switch cameras according to Roles.
- Switching roles now switches the relevant camera automatically.

Dynamics Module Enhancements

There have been several improvements made to the Dynamics module:

- **Selective wake up** is a new way of speeding up simulations with many parts.
  - Parts with "selective wake up" enabled are allowed to fall asleep (thus not taking up computational time) whilst still connected to moving parts, if their own motion falls below the auto-sleep thresholds.
  - Likewise, these parts will only wake up if the external forces and torques applied induce a sufficiently high motion (these thresholds are user defined).
  - By suspending simulation of parts in this way, the selective wake up mode improves simulation performance tremendously for complex scenes with many parts and dense constraint networks.
- **Relative Sleeping** is a performance enhancements approach in which objects which are touching and that are moving with the same motion relative to each other are fused. They sleep, but relative to each other. When a user-specified acceleration threshold is exceeded or when an event occurs (such as a new contact), the fused parts are split again.
  - This essentially creates fusing and splitting rigid bodies depending on their motion profiles
  - Relative sleeping can lead to significant speed ups, specifically when placing many objects (such as containers) on massive moving objects (such as a container ship).
- A significant improvement in the **direct LCP solver** was made, in which, upon failing to produce the correct result, the solver returns the best result which it came across during its solution finding process.
  - The best result is qualified using a physically-based error metric.
  - With this error analysis and the resultant error reduction, jerks and simulation blow ups, which previously were the result of the LCP solver failing to find a solution in the allowed time (number of LCP solver iterations or pivoting steps), are now prevented in most cases and the force errors are reduced to a minimum.
- The **Differential constraint** type can be used as an angular or linear constraint.
  - The switch to change this (SetAngular) is now exposed in the Editor, so the constraint can be used in either mode.
- A new constraint solver interface now provides system matrix blocks using **Eigen matrix types**.
  - This is to allow researchers to use Vortex Studio Essentials for their solver research.

645 Wellington, #301
Montreal, QC H3C 1T2
Canada

+1 514 287-1166
info@cm-labs.com
www.cm-labs.com

Graphics Module Enhancements

There have been changes and improvements made to the Graphics module:

- The Shadow Controller extension has been revised and updated. It is now called the **Adaptive Feature Controller**.
    - It still allows users to control the parametrization and quality of the shadows in a Scene, but also centralize and simplify the feature adaptations (Mirror, Monitor, and Ocean Reflections).
    - The extension automatically synchronizes the various frame-skipping feature adaptations, distributing the calculations of shadows, reflections, and displays to be as efficient as possible given the requested level of visual quality.
    - The new extension makes more information available in its outputs: memory usage, number of shadow views, shadow casting lights, and shadow casting infinite lights, to help with performance optimization.
- Numerous upgrades have been made to the content of the **Vortex Tree Library**.
    - More vegetation types are now available (over 50 types).
    - The anti-aliasing has been improved on leaves and branches, making them appear less blocky and more natural.
    - The ambient occlusion effects have been improved as well, giving more volume and depth to the foliage.
    - If a **Vegetation Wind** extension is added to the scene, vegetation can now react to wind.
        - Wind animation is costly performance-wise; therefore it's possible to activate/deactivate the wind feature for each individual tree.
        - Note that this parameter is different from the Wind parameter in the Skydome. If desired, it would be possible to link them with a script and connection for "one-stop" wind control.

Vortex Studio Editor

There have been changes and improvements made to the Vortex Studio Editor.

- The **Raycast Sensor** extension has been modified to consider the whole universe when no label is specified.
    - It now also works even if no sensor trigger exists.
- A **BSplineAnimation** that is re-enabled now still outputs the last position it had before the automatic reset.
- The shortcut to dump the contents of the VxUniverse into a file was changed from "Shift-p" to "Alt-u".
    - Also, its location in the Editor was moved from the "Debug View" sub-menu to the "Dump to File" sub-menu.

Vortex Studio Player

There have been changes and improvements made to the Vortex Studio Player.

- The Player now **loads content in parallel** for faster loading.
- The Player now reports its global status.

Cable Systems

Cable Systems have been expanded to bring these improvements:

- It is now possible to **reorder waypoints** in a flexible cable.
    - A common use case would be to add a new waypoint between existing ones.

Earthwork Systems

Earthwork Systems have been expanded to bring these improvements:

- It is now possible to simulate soils with **very small soil particle sizes** (~ 1mm).
- It is now possible to have **multiple Graphic Materials** in Soil Clump meshes, for additional visual complexity.
- An Earthwork Zone's height field capture now supports multiple Graphic Materials to provide a more realistic appearance to the soil.

Vortex Marine

Vortex Marine has been expanded to bring these improvements:

- The **Hull Wake** extension has been revised based on feedback from MARIN (MAritime Research Institute Netherlands). The wake now has a more natural shape and appearance; this is most visible when turning or moving sideways.
- MARIN has likewise provided extensive feedback on the **Propeller Wash** extension. Additional parameters now make it easier to set up a wash that matches a real world example.

Vortex Human

Vortex Human has been expanded to bring these improvements:

- An input box for **Fast Transition** has been added to the Human Definition extension. This changes the speed and smoothness of the transitions between two actions (kneeling and standing, for example).
    - By default it is unchecked, so that transition are slower and more natural
    - Checking the box uses the previous "fast" transition speed
    - Backward compatibility is supported: input will be checked when previous versions are loaded

SYSTEM REQUIREMENTS

Supported Platforms

Vortex Studio 2018b runs on the following platforms:

- Microsoft Windows 10 (x64)

*Note: if running on Linux (Ubuntu 14 LTS, CentOS 7), see the **Vortex Studio 2018a** release.*

Hardware Requirements

Vortex Studio requires the following at a minimum:

- CPU 3.4GHz (recommended Intel i7-47xx or better)
- RAM 8GB (recommended 16GB) for runtime and Vortex Studio Player
  16GB (recommended 32GB) for Vortex Studio Editor
- GPU NVIDIA GeForce GTX 7xx, 9xx or 10xx series (GTX770 or higher recommended)

Supported Compiler

Vortex Studio 2018b supports the following C++ compiler:

- For Microsoft Windows Platform, Microsoft Visual Studio Version 2015 (VC14)

Note: the legacy Microsoft Visual Studio Version 2010 (VC10) installers will be available on demand through support only, until the end of 2018.

Supported Graphics

Vortex Studio 2018b supports NVIDIA GeForce video cards.

- NVIDIA GTX 770 and above are tested regularly at CM Labs with driver series 388.59.

*Note: on computers that have multiple graphics cards (e.g., laptops with integrated Intel card and dedicated NVIDIA graphics card), the default configuration of these systems is to auto-select the card to run the application, which might prevent Vortex Studio from running. Using the NVIDIA Control Panel, select **Manage 3D Settings** and change the **Preferred** graphics processor to **High-performance NVIDIA processor**.*

Supported VR Hardware

Vortex Studio 2018b supports the following VR hardware via the OpenVR protocol:

- HTC Vive
- Oculus Rift (DK2)

Python

Python 2.7.13 is supported. The corresponding Anaconda distribution 4.3.0.1 allows for an easy integration of Vortex on various platforms.

Simulink/Matlab

Matlab 2015b is supported.

Licensing

Vortex uses RLM by Reprise Software™ for licensing and can provide node-locked, dongle-based, networked, and multi-user server-based licensing.

645 Wellington, #301
Montreal, QC H3C 1T2
Canada

+1 514 287-1166
info@cm-labs.com
www.cm-labs.com

Compatibility Notice

We recommend that you back up your assets before migrating to the latest version. If saved, it will not be possible to open them again in their original version.

From any version of Vortex Studio
Files from these versions should open with no issue in the newest release.

From Vortex 6.6, 6.7 and 6.8
Files from these versions should open in the newest release. Features may have been updated or deprecated since, requiring adjustments to content.

Between any Vortex version
Record-and-Playback as well as Keyframe files created with previous versions may not work with Vortex Studio 2018b.

End-of-life Notice

Since Vortex Studio 2017
To import assets created before Vortex Studio 2017a, please convert them with a supported version of Vortex first. Note that Vortex Studio 2018a was the last version to directly support files created with Vortex 6.7 and 6.8

Since Vortex 6.5
CM Labs recommends that you port your Vortex-based projects from x86 to x64.
Vortex 6.5 was the last release with dedicated x86 binaries and installers.

Since Vortex 6.3
VxVehicle and VxCable are no longer supported. If you have been using these APIs, please convert your assets using Vehicle Systems and Cable Systems instead.

Microsoft Visual Studio 2010
Vortex Studio now supports Microsoft Visual Studio 2015 (VC14) only.

Legacy Microsoft Visual Studio Version 2010 (VC10) installers will be available on demand through support only, until the end of 2018.

If you are still using VC10, please upgrade now to continue to benefit from the frequent Vortex Studio updates and new features.

Fixed Issues

Summary	Description
KinematicRecorder	Added KinematicRecorder to Application Context.
Licensing Errors	False errors were seen in the license server log.
Support for very small soil particle sizes (~ 1mm)	Creation of the collision grid for soil particles lead to excessive memory consumption with soil presets with very small soil particle sizes (~ 1mm). It is now possible to simulate particles with sizes in this order of magnitude.
Qt Window not always in the correct monitor	A Qt window now enters full screen mode in the monitor it is displayed in.
Bspline animation is not interrupted when simulation is paused.	The Bspline animation now behaves correctly.
Human head control animation is delayed	Animation now behaves normally.
Player: messages time in log window is not accurate	Message time is now fixed.
Orientor in Graphics Galleries are duplicated for multi-viewport configurations	Orientor now behaves normally.
Bspline: Transform's animation is not stopped if deceleration distance is smaller than 0,13m	Animation is now fixed.
Memory leak in Setup document	Leak fixed.
Director icon remains in the system tray after being closed	Issue is now fixed.
Stern Waves at the wrong position	The Kelvin wakes at the stern of a ship now appear at the correct position.

Known Issues

Summary	Description
Mirror Far Distance is NVidia only	Until we upgrade to OpenGL 4.5, the support for the "Far Distance" field in the Mirror extension remains available to users with NVidia video cards only. The Intel and AMD video cards will not obey the distance and will show more objects than expected.

DEPRECATIONS

The followings were deprecated in release 2018b:

- *VxCyclone::PassSnapshot* have been transformed into *VxCyclone::Pass* data-objects. This change simplifies the creation of custom passes and embraces the snapshot engine better. See the documentation for more details.
- *VxRecorder* has been deprecated and replaced by *KinematicRecorder.*
- The *Shadow Controller* extension has been renamed *Adaptive Feature Controller* to reflect its new extended capabilities.

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