



Oculus Rift™ Getting Started Guide

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Contents

Introduction.....	4
System Requirements.....	5
Overview of SDK 0.5.....	6
Changes in SDK 0.5.....	7
Migrating from SDK 0.4.4 to SDK 0.5.....	8
Oculus Rift Hardware Setup.....	9
Oculus Rift DK2.....	9
Oculus Rift DK1.....	10
Oculus Rift Driver Setup.....	11
Installing the Runtime Package.....	11
Windows.....	11
Mac.....	11
Display Setup.....	12
Monitor.....	12
Rift Display Mode.....	13
Updating the DK2 Headset Firmware.....	13
Getting Started.....	15
Device settings.....	15
User Settings.....	16
Advanced Settings.....	16
Testing the Rift using the Demo Scene.....	18
Getting Started with the SDK.....	19
Oculus Rift SDK Setup.....	20
Installation.....	20
Directory Structure.....	20
Compiler Settings.....	20
Makefiles, Projects, and Build Solutions.....	20
Terminology.....	21
Getting Started with the Demos.....	22
Getting Started.....	22
OculusWorldDemo Controls.....	22
OculusWorldDemo Usage.....	23
Next Steps.....	24

Introduction

Welcome to the Oculus Rift Developer Getting Started Guide.

This guide describes how to prepare the Oculus Rift for development. This includes:

- Installing the Oculus Rift hardware.
- Installing the device driver.
- Configuring your user profile.
- Running the Tuscany demo.

After you set up the hardware, the Getting Started Guide describes how to:

- Install the SDK.
- Run the OculusWorldDemo.

System Requirements

Although this section describes the minimum system requirements for Oculus Rift development, Oculus recommends using high performance hardware for the highest-quality immersive experience.

Operating Systems

The Oculus SDK 0.4.0 currently supports Windows 7, 8 and 8.1 and MacOS (10.8, 10.9). There is also an experimental Linux version that supports some Linux distributions.

Minimum System Requirements

There are no specific computer hardware requirements for the Oculus SDK. However, we recommend a computer with a modern graphics card. A good benchmark is to try running Unreal Engine 3 and Unity at 60 frames per second (FPS) with vertical sync and stereo 3D enabled. If this is possible without dropping frames, then your configuration should be sufficient for Oculus Rift development.

The following components are provided as a minimum guideline:

- Windows: 7, 8, or 8.1
- MacOS: 10.8+
- Linux: Ubuntu 12.04 LTS
- 2.5+ GHz processor
- 4 GB system RAM
- DirectX 10 or OpenGL 3 compatible video card.

Many lower end and mobile video cards, such as the Intel HD 5000, have the graphics capabilities to run minimal Rift demos. However, their rendering throughput may be inadequate for full-scene 75 FPS VR rendering with stereo and distortion. Developers targeting this class of hardware will need to be very conscious of scene geometry because low-latency rendering at 75 FPS is critical for a usable VR experience. Irregular display updates are also particularly apparent in VR, so your application must avoid skipping frames.

If you are looking for a portable VR workstation, the Nvidia 650M inside of a MacBook Pro Retina provides minimal graphics power for low end demo development.

Overview of SDK 0.5

The Oculus SDK 0.5 moves from static linking to a dynamic link library (DLL) model.

Using a DLL offers several advantages:

- As long as the arguments and return values are the same, experiences do not need to be recompiled to take advantage of the updated library.
- Localization into new languages is easier because the functions remain consistent across languages.
- The DLL can be updated to take advantage of new features and headsets without affecting current games and experiences.

In addition to moving to a DLL model, the following changes were made:

- SDK versions now use a *product.major.minor.patch* format. The product value is currently set to 0 as this is a pre-release product. For example, 0.5.0.1 means Product 0, Major 5, Minor 0, Patch 1.
- Significant improvements were made to tracking behavior and performance.
- Improvements were made to the samples.
- The SDK now provides better reporting of display driver incompatibility.
- Support for DX10 was removed.
- DX9 support is deprecated and will be removed in a future version of the SDK.
- A bug was fixed where full persistence was inadvertently enabled due to device initialization races.
- Improvements were made to headset USB sleep management.
- Uncommon deadlocks were fixed in the runtime service.
- Diagnostics and configuration capture were improved.
- Monitor rotation is now supported in the legacy Extended mode.
- Default time warp scheduling is improved, which should reduce frame drops.

Changes in SDK 0.5

This section describes changes to SDK 0.5.

The following changes were made:

- Moved and renamed LibOVR/Src/OVR_CAPI.h to LibOVR/Include/OVR_CAPI_0_5_0.h. Some additional public headers such as OVR_Version.h have been moved to LibOVR/Include/. Any other previously public headers are now private to LibOVR.
- Added enum `ovrHmdCaps::ovrHmdCap_DebugDevice`.
- Renamed enum `ovrDistortionCaps::ovrDistortionCap_ProfileNoTimewarpSpinWaits` to `ovrDistortionCap_ProfileNoSpinWaits`.
- Removed enum `ovrDistortionCaps::ovrDistortionCap_NoTimewarpJit`.
- Added enum `ovrDistortionCaps::ovrDistortionCap_TimewarpJitDelay`.
- Removed `ovrTrackingState::LastVisionProcessingTime`.
- Removed `ovrTrackingState::LastVisionFrameLatency`.
- `ovr_Initialize` now takes a `params` argument. See the in-code documentation for details.
- `ovr_Initialize` now returns `false` for additional reasons.
- No API functions can be called after `ovr_Shutdown` except `ovr_Initialize`.
- The `hmdToEyeViewOffset` argument for `ovrHmd_GetEyePosess` is now `const`.
- Added the `ovrQuatf playerTorsoMotion` argument to `ovrHmd_GetEyeTimewarpMatricesDebug`.
- Added `ovr_TraceMessage`.

Migrating from SDK 0.4.4 to SDK 0.5

The Oculus SDK 0.5 moves from static linking to a dynamic link library (DLL) model.

Overview

Prior to SDK 0.5, LibOVR is statically linked into applications. Starting with SDK 0.5, LibOVR is a separate DLL named LibOVRRT (LibOVR runtime).

To use LibOVR, link to the LibOVR project instead of directly linking to the LibOVRRT DLL; this enables LibOVR to run on end-user systems if they don't have the Oculus runtime. This can be useful for applications that support a non-VR mode.

The LibOVR project and source is distributed with the SDK, along with a pre-built version of the LibOVRRT DLL.

Windows

When installed on a user's system, LibOVR searches for the LibOVRRT DLL in the Windows system directories as with other system DLLs. Please do not distribute the DLL directly to users; the DLL is automatically installed by the Oculus runtime installer.



Note: To view the version of the installed LibOVRRT DLL, right-click it and select Properties -> Details.

Mac

On the Mac, LibOVRRT is a dylib framework and LibOVR is a static library framework.

To use it, add LibOVR.framework to your project; it includes the relevant headers, static library, and some Cocoa-style frameworks.

Linux

On Linux, LibOVRRT is a shared library that uses version numbering similarly to other Linux shared libraries.

Similar to Windows, LibOVR is a static library that dynamically links to LibOVRRT at runtime.

Oculus Rift Hardware Setup

Because VR is a new medium, you will need to do a lot of testing during development. Before installing the SDK, Oculus recommends making sure the hardware is correctly configured and tested. If the Rift is already configured, you can skip this section.

Oculus Rift DK2

Instructions for setting up DK2 hardware are provided in the Quick Start Guide that shipped with the device.

Figure 1: The Oculus Rift DK2



The DK2 headset incorporates a number of significant improvements over the DK1:

- **Higher Resolution and Refresh Rate**—1920x1080 (960x1080 per eye) resolution and a maximum refresh of 75Hz.
- **Low Persistence OLED Display**—helps reduce motion blur and judder, significantly improving image quality and reducing simulator sickness.
- **Positional Tracking**—precise low latency positional tracking ensures all head motion is tracked.
- **Built-in Latency Tester**—constantly measures system latency to optimize motion prediction and reduce perceived latency.

Additional instructions are provided in the Oculus User Guide, which is available at <http://developer.oculusvr.com>.

Oculus Rift DK1

Instructions for setting up DK1 hardware are provided in the Oculus Rift Development Kit manual that shipped with the device.

Figure 2: The Oculus Rift DK1



Additional instructions are provided in the Oculus User Guide, which is available at <http://developer.oculusvr.com>.

Oculus Rift Driver Setup

Before you can use the SDK, you must set up the drivers for your operating system.

If your drivers are already set up, you can skip this section. This content repeats the instructions in the *Oculus Rift User Guide*.

Installing the Runtime Package

If you do not have it yet, download the Oculus Runtime Installer from the Oculus website.

The Runtime is available from <https://developer.oculus.com/downloads/>.

This will install the following components:

- Oculus Display Driver (Windows Only)
- Oculus Positional Tracking Sensor Driver
- Oculus Service Application
- Oculus System Tray Application and Configuration Utility

Windows

This section describe how to install the Windows Runtime Package.

To install the package:

1. Download the runtime from <https://developer.oculus.com/downloads/>.
2. In the Windows Control Panel, go to Programs -> Programs and Features and uninstall any existing components.
3. Run the install executable found in this package. This will install all the components described above and prompt you to restart your computer.
4. Restart your computer.

Mac

This section describe how to install the Mac Runtime Package.

To install the package:

1. Download the runtime from <https://developer.oculus.com/downloads/>.
2. Run the installer application found inside the package. This will install all components described above for the current user only. You must run the installer for each user that wants to use the Rift.
3. Since the MacOS does not currently support direct rendering, you must adjust your display settings to rotate the display by 90 degrees for the Oculus Rift DK2. The display settings are located in System Preferences -> Displays. Additionally, consider disabling display mirroring via the Mirror Displays check box on the display adjustment tab.
4. If you want to remove the Runtime package for the current user, run the provided Uninstaller or run the `OculusDirectory/Agent/uninstallAgent.sh` shell script from the command line.

Display Setup

Now that the drivers are installed, you are ready to configure the display settings.

Monitor

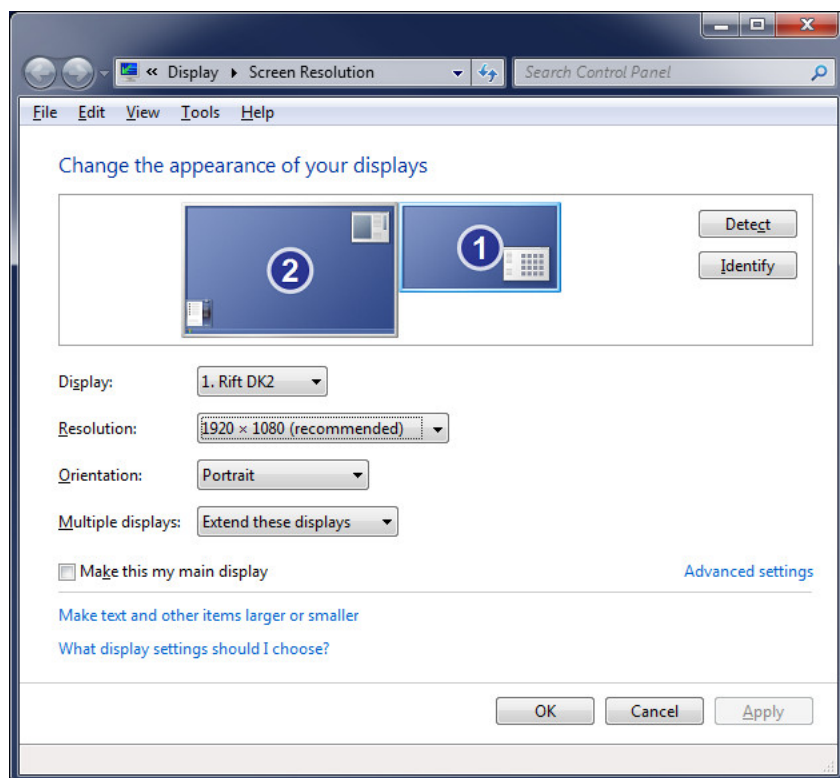
Previously, when the Rift was connected to your computer it would be automatically recognized and managed as an additional monitor.

With the introduction of the Oculus Display Driver, this is no longer necessary. However, you can revert to the old mode through the Rift Display Mode control panel by selecting the *Extend Desktop* or *DK1 Legacy App Support* modes. You can open the display mode control panel by double-clicking the Oculus system tray icon.

When in the *Extend Desktop* legacy mode, the Rift appears as an additional monitor and you should make sure it is configured properly within the Operating System display settings. The Oculus DK1 can be set to either mirror or extend your current desktop monitor setup, while with DK2 is not set up for mirroring. We recommend using the Rift as an extended monitor in most cases, but it is up to you to decide which configuration works best. This is covered in more detail later.

When configuring the Rift as a display for DK1, you should set the resolution to 1280 * 800. For the DK2, the resolution should be set to 1920 * 1080 (it might appear as 1080 * 1920) and it might be necessary to manually change the orientation to horizontal. The following figure shows the DK2 correctly configured in extended display mode in Windows.

Figure 3: Extended Display Mode

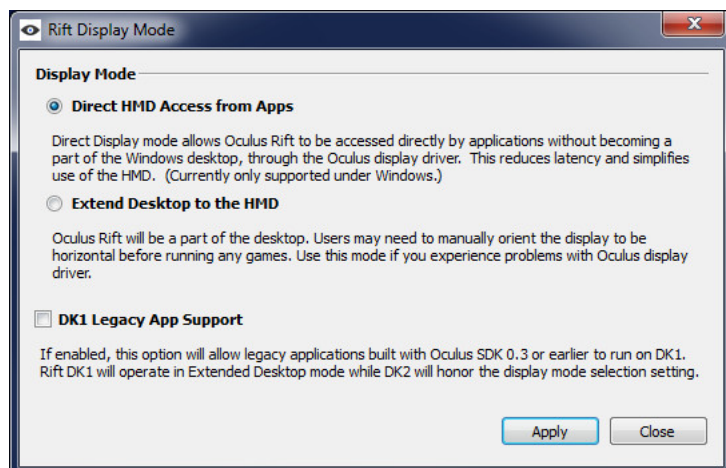


Rift Display Mode

The Rift Display Mode dialog box enables you to change the display mode for development and to run different types of applications.

The following figure shows the dialog box:

Figure 4: Rift Display Mode Dialog Box



Select from the following:

- Direct HMD Access from Apps—this is the recommended mode. Rifts connected to the PC will not appear as additional monitors and will be automatically used by Rift-enabled applications.
- Extend Desktop to the HMD—this is provided for debugging purposes in the event that there are problems with the Direct HMD Access mode.

The dialog box also includes a DK1 Legacy App Support check box. When selected, DK1 owners can run Rift-enabled applications built with the legacy Oculus SDK 0.3.1 or earlier; it does not permit these applications to run on DK2 devices. Make sure to disable it for Rift-enabled apps built with Oculus SDK 0.4.1 or newer.

This panel is also available from within the Oculus Configuration Utility under the Tools menu.



Note: MacOS currently runs in extended mode; the direct and extended mode options are disabled.

Updating the DK2 Headset Firmware

Although the DK2 headset ships with firmware version 2.10, it must be updated to the latest firmware version.

To update the firmware:

1. Connect your DK2 and make sure that it shows up as connected in the Oculus Configuration Utility
2. Select Tools > Advanced > Update Firmware...

You are prompted to select a file.

3. Select a file (e.g., `Firmware/DK2/DK2Firmware_2_12.ovrf`).

The firmware begins updating.

4. After the update finishes, shut down and restart the Oculus Configuration Utility.

The update is complete.

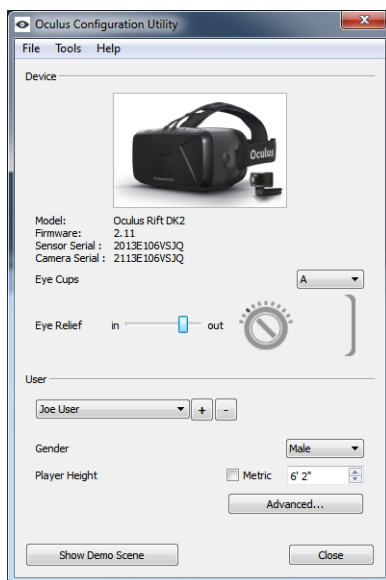
Getting Started

The Oculus Configuration Utility enables you to configure Oculus headsets and to generate device and user profiles.

For added comfort, performance, and immersion, profiles enable users to personalize the VR experience across all Rift-enabled applications. While a reasonable default experience is supplied by the Oculus SDK, Oculus highly recommends that users use the Oculus Configuration Utility to fine-tune their own personal experience.

The following figure shows the main screen of the Oculus Configuration Utility. The top section contains Device settings, and the bottom section contains User settings. You should see an image of your Rift. If not, plug it in and turn it on.

Figure 5: Oculus Configuration Utility



The first time you run the Oculus Configuration Utility, create and configure a user profile.

To create a user profile, click + and type a username. Then, configure the settings. Any changes are automatically saved.

Device settings

Device settings are part of each user profile; they describe a user's preferred hardware settings while wearing the headset.

The following settings can be changed:

- **Eye Cups**—specifies the lenses that ship with the Oculus Rift; each type has a different height and focal length. The number of lenses included varies depending on the Rift model. The DK1 ships with three types (A, B, and C) while DK2 ships with two (A and B). In each case, the A type is pre-installed at the factory and is designed for people with normal vision. Nearsighted users might prefer the B or C type. The Oculus Configuration Utility should be set to each user's preferred type.



Note: Oculus recommends the use of the A cups unless the other cups give you a clearer image and better experience.

- **Eye Relief**—the distance between surface of the lens and the user's eye (cornea). The Rift headset has a dial on either side of it that can be adjusted with a coin to lengthen or shorten this distance. Each user should experiment with this setting to find a distance that is comfortable. The Eye Relief slider in the Oculus Configuration Utility should be adjusted to match the dial setting on the hardware. The wheel and face-plate icons depict the right hand side of a headset that is facing to the right. The slider control can be used to turn the wheel. "In" refers to the setting where the lenses are closest to your eyes, and "out" refers to setting where they are farthest.

User Settings

User settings contain the physical characteristics of each person using the Rift, to customize the experience.

It is important to set these correctly. Carefully tuning these values will increase and can lead to a better sense of presence.

- **Gender**—adjust various body size parameters based on population statistics (optional). Applications can also use this parameter to set the gender of the player avatar.
- **Player Height**—the height of the user. The height can be specified in either metric or standard units by selecting or clearing the Metric check box. Developers are encouraged to use this value to set the player avatar to the same height as the user's actual height and to set the cameras to the appropriate eye height. This leads to a familiar sense of size and embodiment when in VR.

Advanced Settings

Advanced settings can greatly improve the quality of the VR experience, but they are a bit more subtle than the basic settings and require a deeper level of understanding and patience to set properly.

Advanced settings include:

- **Eye To Neck Distance**—the Oculus SDK implements a neck model to simulate positional movement of the eyes as you turn your head while wearing a DK1. For example, if you nod your head up and down the center of rotation of the eyes is not at a point on your nose but at a point in your spine called the neck pivot. The vector between the neck pivot and the center of your eyes is defined by a vertical and horizontal distance. The vertical distance is approximately the distance from the corner of your eye to the bottom of your jaw. The horizontal distance is approximately the distance from the corner of your eye to the middle of your ear. These can serve as decent starting points, but each person is different and you should experiment in VR with different lengths to find values that feel correct. Since DK2 uses positional tracking, these parameters are not relevant for DK2 users.
- **Eye Position**—the position of each eye with respect to the lens of the current device type (it is maintained separately for DK1 and DK2 should you own both).
- **IPD**—the interpupillary distance (IPD) is the lateral distance between the pupils of each eye. This value can be measured by an optometrist or by hand and set directly.
- **Eye Relief**—the distance between the headset lens and the cornea. This distance is defined both by the facial structure of the user, as well as the eye relief dial on the side of the headset. Adjusting the Eye Relief control on the main window will change this value.
- **Measure**—a visual tool that is used to estimate the exact position of each eye and calculate the IPD and Eye Relief values. It requires that the user put on the headset and move vertical green lines to find the edge of their visible field of view. It measures each eye independently. It can detect and handle asymmetries in eye position.
- **Personalized Rendering**—Many of the profile settings are designed to modify aspects of the rendering and provide a personalized visual experience. You can disable this feature by clearing the Enable Personalized

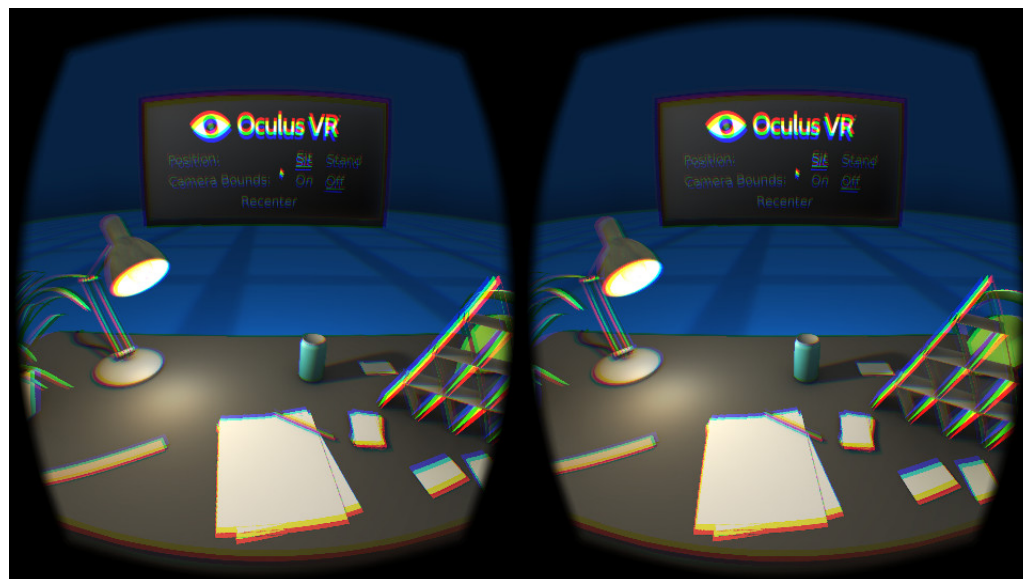
Rendering check box. When disabled, several of the profile settings will be ignored and a default generic rendering mode is used instead.

Testing the Rift using the Demo Scene

After you have configured your user profile, you can view a sample VR scene that uses these settings.

The following figure shows the demo scene:

Figure 6: Demo Scene



To test the settings:

1. Sit comfortably in front of the keyboard and mouse.
2. Click Show Demo Scene and put on the headset.

A menu appears in front of you. If it does not appear, your real world forward direction isn't aligned with the forward direction in the scene. To realign the forward direction, press the spacebar.

3. Click the Start button with the mouse.

A single room with familiar objects appears to give a sense of familiarity and scale.

4. Experiment with the following options:
 - Recenter with the mouse—adjusts the scene for your nominal position.
 - Show Camera Bounds—displays black lines showing the range and field of view of the Positional Tracking Sensor. Adjust the sensor so the red line in the center is aimed at your face. Click Recenter (or press the spacebar) until you are comfortably sitting in the center of the Sensor field of view. Then, turn the camera bounds off.
 - Stand—adjusts the VR view to a standing height.
5. If this scene does not feel natural or the scale of objects seems incorrect, consider using the advanced settings. The Configuration Utility controls are duplicated in the demo scene, so you do not need to exit the scene to change those settings.
6. When you are done viewing this scene, press the Esc key.

Getting Started with the SDK

Now that your Oculus Rift is plugged in and the drivers are installed, you are ready to install the SDK and try the demos.

Oculus Rift SDK Setup

This section describes how to set up the SDK.

Installation

The latest version of the Oculus SDK is always available from the Oculus Developer Center.

To download the latest package, go to <http://developer.oculusvr.com>.

SDK versions use a *product.major.minor.patch* format. For example, 0.5.0.1 means Product 0, Major 5, Minor 0, Patch 1.



Note: The instructions in this section assume you have installed the Oculus Rift and Oculus runtime package.

Directory Structure

The directory structure of the Oculus SDK package is straightforward.

It uses the following directory structure:

`3rdParty`—third party SDK components used by samples, such as TinyXml.

`Doc`—SDK Documentation, including this document.

`Firmware`—firmware files for the Oculus tracker.

`LibOVR`—libraries, source code, projects, and makefiles for the SDK.

`LibOVR/Include`—public include header files, including `OVRR.h`.

`LibOVR/Lib`—pre-built libraries for use in your project.

`LibOVR/Src`—source code and internally referenced headers.

`Samples`—samples that integrate and leverage the Oculus SDK.

`Tools`—configuration utility.

Compiler Settings

The `LibOVR` libraries do not require exception handling or RTTI support.

Your game or application can disable these features for efficiency.

Makefiles, Projects, and Build Solutions

Developers can rebuild the samples and `LibOVR` using the projects and solutions in the `Samples` and `LibOVR/Projects` directories.

Windows

Solutions and project files for Visual Studio 2010, 2012 and 2013 are provided with the SDK. `Samples/Projects/Windows/VSxxxxx/Samples.sln`, or the 2012/2013 equivalent, is the main solution that allows you to build and run the samples, and LibOVR itself.

MacOS

The included Xcode workspace `Samples/Projects/Mac/Samples.xcworkspace` allows you to build and run the samples, and LibOVR itself. The project is configured to build universal binaries (x86 and x86_64) for all recent MacOS versions (10.8 and newer).

Linux (Experimental)

A makefile is provided in the root folder that allows you to build LibOVR and the OculusWorldDemo sample. The code is dependent on the `udev` and `Xinerama` runtime components. As a result, you must install the relevant packages before building. You must also install a `udev/rules.d` file to set the correct access permissions for Oculus HMD devices.

These steps can be performed by executing the provided script `ConfigurePermissionsAndPackages.sh`, located in the root folder of the SDK.


Terminology

You should familiarize yourself with these terms, which are frequently used in the rest of this document.

Head-mounted display (HMD)	A general term for any VR device such as the Rift.
Interpupillary distance (IPD)	The distance between the eye pupils. The default value in the SDK is 64 millimeters, which corresponds to the average human distance, but values between 54 and 72 millimeters are possible.
Field of view (FOV)	The full vertical viewing angle used to configure rendering. This is computed based on the eye distance and display size.
Tan Half FOV	The tangent of half the FOV angle. Thus a FOV of 60 degrees has a half-FOV of 30 degrees, and a tan-half-FOV value of $\tan(30)$ or 0.577. Tan half FOV is considered a more usable form in this use case than direct use of FOV angles.
Aspect ratio	The ratio of horizontal resolution to vertical resolution. The aspect ratio for the Oculus Rift DK2 is 1920x1080 (960 x 1080 per eye or 0.89). The aspect ratio for each eye on the Oculus Rift DK1 is 640/800 or 0.8.
Multisampling	Hardware anti-aliasing mode supported by many video cards.

Getting Started with the Demos

Now that the Rift is plugged in, the drivers are installed, and the SDK is installed, you are ready to begin using the SDK.

 **Note:** If you haven't already, take a moment to adjust the Rift headset so that it's comfortable for your head and eyes. More detailed information about configuring the Rift can be found in the Oculus Rift Hardware Setup this guide.

After the hardware is configured, the next step is to test the development kit. The SDK comes with a set of full-source C++ samples designed to help you get started quickly. These include:

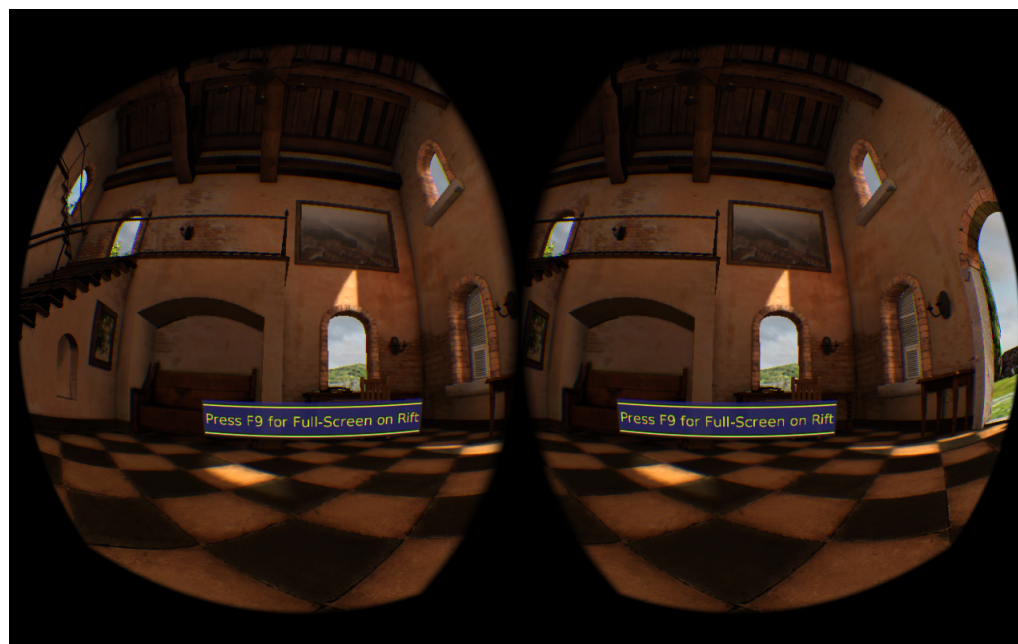
- **OculusWorldDemo**—A visually appealing Tuscany scene with on-screen text and controls.
- **OculusRoomTiny**—A minimal C++ sample showing sensor integration and rendering on the Rift (only available for D3DX platforms as of 0.4. Support for GL platforms will be added in a future release).

Getting Started

Oculus recommends running the pre-built OculusWorldDemo to explore the SDK. You can find a link to the executable file in the root of the Oculus SDK installation.

The following is a screenshot of the OculusWorldDemo application:

Figure 7: OculusWorldDemo Application



OculusWorldDemo Controls

The OculusWorldDemo uses a mix of standard and specialized controls.

The following table describes keys and devices that you use for movement:

Table 1: Movement

Key or Input	Movement
W, S	Move forward, back
A, D	Strafe left, right
Mouse	Look left, right
Left gamepad stick	Move
Right gamepad stick	Turn

The following table describes keys that you use for functions:

Table 2: Functions

Key(s)	Function
F4	Multisampling toggle
F7	Mono/stereo view mode toggle
F9	Hardware full-screen (low latency) *
F11	Windowed full-screen (no blinking) *
E	Motion relative to head/body
R	Reset sensor orientation
Esc	Cancel full-screen
-, +	Adjust eye height
L	Adjust fourth view value
Tab	Options Menu
Spacebar	Toggle debug info overlay
T	Reset player position
Ctrl+Q	Quit
G	Cycle grid overlay mode
U, J	Adjust second view value
I, K	Adjust third view value
;	Cycle rendered scenes
+Shift	Adjust values quickly
O	Toggle Time-Warp
C	Toggle FreezeEyeUpdate
V	Toggle Vsync

* Only relevant in Extend Desktop display mode.

OculusWorldDemo Usage

Once you've launched OculusWorldDemo, you should see a window on your PC monitor similar to the previous screenshot.

Depending on the settings chosen in the Display Mode dialog of the Oculus system tray, you might also see the image displayed inside the Rift. If it is set to Direct Display, the Oculus display driver manages the Oculus Rift and will automatically display the rendered scene. If Extended Desktop is selected or you are using a DK1 and the DK1 Legacy Support check box is selected, the Oculus Rift display uses extended desktop mode. In this case, you should press F9 or F11 to switch rendering to the Oculus Rift as follows:

- **F9**— switches to hardware full-screen mode. This will give best possible latency, but may blink monitors as the operating system changes display settings. If no image shows up in the Rift, then press F9 again to cycle to the next monitor.
- **F12**—Instantly switches the rendering window to the Rift portion of the desktop. This mode has higher latency and no vsync, but is convenient for development.

If you're having problems (for example, no image in the headset, no head tracking, and so on), please view the [Developer Forums](#).

When the image is correctly displayed inside the Rift then take a moment to look around in VR and double-check that all of the hardware is working properly. If you're using a DK2 then you should be able to see that physical head translation is now also recreated in the virtual world as well as rotation.

Important: If you need to move the DK2 external camera for any reason after initial calibration, be sure to minimize the movement of the HMD for a few seconds while holding it within the tracking frustum. This will give the system chance to recalibrate the camera pose.

If you would like to explore positional tracking in more detail, you can press the semicolon (;) key to bring the "sea of cubes" field that we use for debugging. In this mode, cubes are displayed that allow you to easily observe positional tracking behavior. Cubes are displayed in red when head position is being tracked and in blue when sensor fusion falls back onto the head model.

There are a number of interesting things to take note of the first time you experience OculusWorldDemo. First, the level is designed to scale. Thus, everything appears to be roughly the same height as it would be in the real world. The sizes for everything, including the chairs, tables, doors, and ceiling, are based on measurements from real world objects. All of the units are measured in meters.

Depending on your actual height, you may feel shorter or taller than normal. The default eye height of the player in OculusWorldDemo is 1.61 meters (approximately the average adult eye height), but this can be adjusted using the using the '+' and '-' keys. Alternatively, you can set your height in the Oculus Configuration Utility (accessed through the Oculus System Tray Icon).

OculusWorldDemo includes code that shows how to use values set in the player's profile such as eye height, IPD, and head dimensions, and how to feed them into the SDK to achieve a realistic sense of scale for a wide range of players. The scale of the world and the player is critical to an immersive VR experience. More information about scale is available in the Oculus Best Practices Guide.

Next Steps

After trying the OculusWorldDemo, there are other samples and tools.

Software Developers and Integration Engineers

If you're integrating the Oculus SDK into your game engine, Oculus recommend starting with the sample projects.

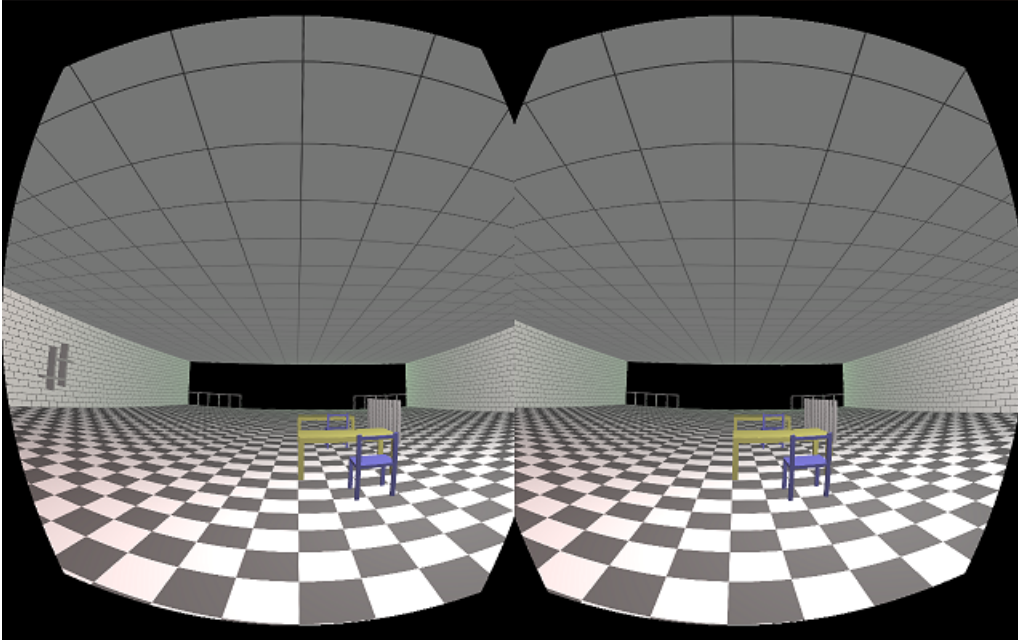
Open the following projects, build them, and experiment with the provided sample code:

- Samples/Projects/Windows/VSxxxx/Samples.sln
- Samples/Projects/Mac/Samples.xcworkspace

OculusRoomTiny

This is a good place to start, because its source code compactly combines all critical features of the Oculus SDK. It contains logic necessary to initialize LibOVR core, access Oculus devices, use the player's profile, implement head-tracking, sensor fusion, stereoscopic 3D rendering, and distortion processing.

Figure 8: OculusRoomTiny



OculusWorldDemo

This is a more complex sample. It is intended to be portable and support many more features. These include windowed/full-screen mode switching, XML 3D model and texture loading, movement collision detection, adjustable view size and quality controls, 2D UI text overlays, and so on.

This is a good application to experiment with after you are familiar with Oculus SDK basics. It also includes an overlay menu with options and toggles that customize many aspects of rendering including FOV, render target use, timewarp and display settings. Experimenting with these options may provide developers with insight into what the related numbers mean and how they affect things behind the scenes.

Beyond experimenting with the provided sample code, Oculus recommends reading the rest of this guide. It covers LibOVR initialization, head-tracking, rendering for the Rift, and minimizing latency.

Artists and Game Designers

If you're integrating the Oculus SDK into your game engine, Oculus recommends starting with the sample projects.

If you're an artist or game designer unfamiliar with C++, we recommend downloading UE3, UE4 or Unity along with the corresponding Oculus integration. You can use our out-of-the-box integrations to begin building Oculus-based content immediately.

The *Unreal Engine 3 Integration Overview* document and the *Unity Integration Overview* document, available from the Oculus Developer Center, detail the steps required to set up your UE3/Unity plus Oculus development environment.

We also recommend reading through the *Oculus Best Practices Guide*, which has tips, suggestions, and research oriented around developing great VR experiences. Topics include control schemes, user interfaces,

cut-scenes, camera features, and gameplay. The *Best Practices Guide* should be a go-to reference when designing your Oculus-ready games.

Aside from that, the next step is to start building your own Oculus-ready game or application. Thousands of other developers are out building the future of virtual reality gaming. To see what they are talking about, go to developer.oculusvr.com/forums. To see what they are building, go to share.oculus.com.