



## Ubuntu Desktop Certified Hardware Self Testing Guide

Version 1.2

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## Introduction

The aim of this document is to provide all the information needed to perform testing of a system running Ubuntu Desktop. The guide will provide information on downloading and installing the necessary packages for running the Checkbox Desktop Testing Suite, configuring the system to be tested, running tests and reviewing results.

Running this tests does not grant Ubuntu Certification. To get a system certified, OEMs or ODMs need to enter into a commercial agreement with Canonical.

To successfully perform testing, you will need several items, starting with the system to be tested. You will also need a clean LAN with at least one or two other systems that will respond to pings. You will need external hardware as well for testing devices like Wi-Fi, Bluetooth, external ports and so forth. The following pages will give you full details on the hardware necessary for testing, suggestions for setting up a usable test LAN and how and when to use various pieces of external test equipment.

The guide will also walk you step by step through installing the Checkbox testing tool, necessary dependency packages and launching Checkbox and running the various tests. Finally, this guide will give you information on interpreting test results and submitting those results to Canonical.

Additionally, the Appendix section will provide some info on troubleshooting common testing issues, filing bugs appropriately and other useful information for testers.

## Glossary

Definitions of terms used within this document:

**SUT** - System Under Test, the machine you are testing (e.g. a Laptop or Desktop system running Ubuntu Desktop)

**Target System** - A second system to act as a Bluetooth and network traffic target during testing

## Requirements

To be able to certify a desktop system, the following requirements have to be met:

### Before running test cases

The SUT must be properly configured, cabled and installed with the correct ISO image of Ubuntu Desktop **with no updates installed**.

The canonical-certification-client package installed on the system under test together with all its dependencies.

This includes not only the packages that contain the test cases themselves, but also the packages that contain the tools needed to execute them.

For more information about how to get all the packages, please refer to the [Canonical Certification Client](#) section below.

All the items described in the [Canonical Certification Client](#) section below.

## Initial setup

### Getting the Checkbox packages

This guide assumes that your test LAN is not Internet-accessible due to your company's security and privacy rules. The instructions for getting and installing canonical-certification-client are designed for the "No Internet Access" scenario. If your lab does have Internet access, on the other hand, you can install everything via apt-get after adding the proper repository. This process is described in the [Installing Checkbox](#) section of this document.

If you do not have Internet access from your LAN, you can find the pre-built tarball including the canonical-certification-client package and all of its dependencies under:

<https://certification.canonical.com/offline>

Simply copy the appropriate .tar.gz file to a USB stick and bring this with you when testing the system.

### Required Testing Equipment

Running the full test suite requires certain bits of hardware that are used to perform various tests. You should have the following on hand:

#### Audio Testing

- Headset (including microphone) with the correct plugs for your machine for audio testing.

- HDMI/DisplayPort Audio device (monitor that accepts HDMI/DisplayPort Audio input, or a standalone HDMI audio converter that accepts headphone connections).

- Bluetooth audio device (A standard BT cellphone headset will work).

- Optional: 3.5mm Jack patch cable.

#### Bluetooth Testing

- A target system with a Bluetooth device (different from the SUT, See Bluetooth setup below).

- Bluetooth Mouse or Keyboard.

#### Input

- Desktops: Mouse and Keyboard (USB or PS/2).

#### Miscellaneous Devices

- eSATA/USB ExpressCard device for testing ExpressCard slots.

#### Optical Drives

- Data CDs with some files written to it. This is required to test the system's

optical drive read capabilities. Note that a movie DVD or an audio CD won't be useful in this case, as they are not in the right format for the test. If you need to test more than one system then **bring one media per system**.

Blank optical media (CD and DVD +R or -R) You will also need blank media to test your system's optical drive writing capabilities.

## Removable Storage

MultiMedia cards in the following formats: MMC (or MMCPlus), SD, SDHC.

Firewire external HDD for systems that have Firewire (IEEE 1394) ports.

MiniFirewire to Firewire adapter.

eSATA external HDD for systems that have eSATA ports.

## SIM Card

### USB (2.0 and 3.0)

Desktops: Mouse and Keyboard.

Laptops: Mouse or Keyboard.

Writable USB stick with enough free space (> 1MB). It must contain a writable filesystem and a partition on it. If you need to test more than one system then **bring one USB stick per system**.

USB 3.0 storage device. If your system has USB 3.0 ports, you must have a USB 3.0 storage device for USB 3.0 specific testing. This can be an external HDD or a USB key, but it MUST be a USB 3.0 device.

## Video

External monitor with appropriate connections. Desktops and laptops generally come with external video in VGA, DVI, DisplayPort, or HDMI. Some systems may also have S-Video or RCA (Component) video out.

Appropriate connectors/converters, such as:

- Mini DisplayPort to HDMI

- DisplayPort to HDMI

- DVI-D to VGA

- DVI-I to VGA

- Mini HDMI to HDMI

- DVI-D to HDMI

- DVI-I to HDMI

## Wireless Networking

6 wireless routers are preferred, but at least 1 wireless router is required and must support B/G, and N protocols, and optionally AC. See Wi-Fi setup instructions below for more information.

## < UfXk UfY'GYh d'

Testing environments vary from location to location, but the following should be considered the minimum requirements for setting up the SUT and test environment.

Systems should not contain any extraneous PCI devices that are not part of the certification.

This includes things like Network, SAN and iSCSI cards.

Hardware RAID cards are allowed if they are used to provide RAID services to the SUT's onboard storage.

Systems should be running a release level BIOS configured using factory default settings.

Storage should be properly configured.

If the SUT is to be tested using RAID, then the proper Hardware RAID configuration should set up prior to testing.

Any additional HDDs or LUNs should be partitioned and mounted prior to testing.

If possible, as much RAM as is practicable (up to the advertised maximum for the SUT) should be installed.

The test environment should have a working network setup. Internet access is not required, and testing should work on any private or segregated LAN

Additionally, the test LAN should match the hardware on the SUT. Thus, a system with 1Gb onboard Ethernet should be connected to a LAN capable of at least 1Gb.

Every wired network device should be connected and properly configured. Do not set up any wireless connections prior to testing, as this will be done during the test run.

It is recommended that SUT and Target machines be on a clean network (e.g. one that is not full of other traffic) as this could impact the network testing results.

The test LAN should have at least one other system available to act as a target for network testing. No special software is required, but the system should be pingable.

## 6`i YrcH `GYfi d`

1. Install the Target system with Ubuntu 12.04. This system must have a Bluetooth enabled device.
2. Run 'hciconfig' on this system and note the value of the 'BD Address' field (something like 00:00:00:00:00:00)
3. On the Target system, run the following commands to initialise the target Bluetooth OBEX server:
  - a. apt-get install obexftp
  - b. killall obex-data-server
  - c. mkdir ~/.obexftp
  - d. obexftpd -c ~/.obexftp -b
4. On the SUT, you then need to make sure the Bluetooth device address from step 2 is configured in checkbox. Create a file at '/etc/xdg/plainbox.conf' and add a section like:

```
Yæ^{↔ã~^↑æ^\ŸÁ  
ÑÚŒÓÛÑŒŒÁKÁJÑ→|æ\~~\áÁNääãæbbLÁ
```

Á

And save the file.

## Wireless Setup

Certification testing requires that the following aspects of a systems wireless hardware are tested explicitly:

Connecting to a router on the 802.11n wireless band, where supported.

Connecting to a router on the 802.11bg band.

Connecting to a router with the 802.11ac protocol, where supported.

Connecting to a router using the WPA2 security mode.

Connecting to a router using no security (referred to as 'open').

The preferred way of performing this testing is to have 6 routers available, each of them configured with a particular combination of bands and security settings (802.11n, WPA & Open; 802.11bg, WPA & Open; and 802.11ac, WPA & Open). However, since it is understandable that it won't always be possible to have the same setup, the option is given to run the tests with a single router.

## Multi-router setup

For this setup you will need six individual routers, preferably all of the same make. Each router will have to be configured with the following settings - note that different routers have different software for administering them, so it is **not** possible to provide exact instructions here. Please refer to your router's manual for guidance:

Router one (B/G, WPA):

Make sure **all** channels (assuming the router supports multiple channels) are configured to have the same SSID. This can be whatever you want, but must distinguish this router from the others. We recommend something like 'ubuntu-wpa-bg'. Any channels that do not support 802.11B/G must be **switched off**.

Ensure **all** channels that support it are using the 802.11B/G band.

Set the security mode of the router to WPA2 and set a PSK of your choosing. Unlike the SSID there is no need for this to be unique.

Router two (B/G, Open)

Make sure **all** channels (assuming the router supports multiple channels) are configured to have the same SSID. This can be whatever you want, but must



distinguish this router from the others. We recommend something like 'ubuntu-open-bg'. Any channels that do not support 802.11B/G must be **switched off**.

Ensure **all** channels that support it are using the 802.11B/G band.  
Switch off security entirely.

## Router three (N, WPA):

Make sure **all** channels (assuming the router supports multiple channels) are configured to have the same SSID. This can be whatever you want, but must distinguish this router from the others. We recommend something like 'ubuntu-wpa-n'.

Ensure **all** channels that support it are using the 802.11N band.

Set the security mode of the router to WPA2 and set a PSK of your choosing. Unlike the SSID there is no need for it to be unique.

## Router four (N, Open)

Make sure **all** channels (assuming the router supports multiple channels) are configured to have the same SSID. This can be whatever you want, but must distinguish this router from the others. We recommend something like 'ubuntu-open-n'.

Ensure **all** channels that support it are using the 802.11N band.

Switch off security entirely.

## Router five (AC, WPA):

Make sure **all** channels (assuming the router supports multiple channels) are configured to have the same SSID. This can be whatever you want, but must distinguish this router from the others. We recommend something like 'ubuntu-wpa-ac'.

Ensure **all** channels that support it are using the 802.11AC protocol, and disable any other protocols.

Set the security mode of the router to WPA2 and set a PSK of your choosing. Unlike the SSID there is no need for it to be unique.

## Router six (AC, Open)

Make sure **all** channels (assuming the router supports multiple channels) are configured to have the same SSID. This can be whatever you want, but must distinguish this router from the others. We recommend something like 'ubuntu-open-ac'.

Ensure **all** channels that support it are using the 802.11AC protocol, and disable any

other protocols.  
Switch off security entirely.

## Multi-router Checkbox Configuration

It is necessary for Checkbox to be configured to be aware that it needs to run the tests which assume a multiple router setup. It also needs to be provided with the details (SSIDs and PSKs) of all the routers. To do this you need to edit the file:

```
Ðæ\`Ð[ ä&Ð*→á↔^â~[ È´ ~^àÁ  
Á
```

Insert the following section, making sure to replace the values where shown:

```
Yæ^{↔ã~^↑æ^\`ÝÁ  
ĔŠŮŮÓĔUÁKÁ↑|→\↔*→æÁ  
ÛŞNŽŇŎŽUUØĚÁKÁJbb↔ăĂă~ăĂă~|\æăĂ~^æLĂ  
ÛŞNŽŇŎŽŞUPÁKÁJ*b←Ăă~ăĂă~|\æăĂ~^æLĂ  
ÛŞNŽŞŽUUØĚÁKÁJbb↔ăĂă~ăĂă~|\æăĂ\}~LĂ  
ÛŞNŽŞŞUPÁJ*b←Ăă~ăĂă~|\æăĂ\}~LĂ  
ÛŞNŽNOŽUUØĚÁKÁJbb↔ăĂă~ăĂă~|\æăĂ\ăăææLĂ  
ÛŞNŽNOŽŞUPÁKÁJ*b←Ăă~ăĂă~|\æăĂ\ăăææLĂ  
ŠŞÓŠŽŇŎŽUUØĚÁKÁJbb↔ăĂă~ăĂă~|\æăĂă~|ăLĂ  
ŠŞÓŠŽNOŽUUØĚÁKÁJbb↔ăĂă~ăĂă~|\æăĂă↔{æLĂ  
ŠŞÓŠŽŞUUØĚÁKÁJbb↔ăĂă~ăĂă~|\æăĂb↔[LĂ
```

## Single router setup

This setup is to be used only if you have access to only one router. You will be prompted to reconfigure the router by the test. Since the instructions for configuration are in the test descriptions themselves, the only thing you need to get started here is to configure Checkbox.

## Single-router Checkbox Configuration

It is necessary for Checkbox to be configured to be aware that it needs to run the tests that assume a single router setup. It also needs to be provided with the SSID and PSK of that system. To do this you need to edit the file:

```
Ðæ\`Ð[ ä&Ð*→á↔^â~[ È´ ~^àÁ  
Á
```

Insert the following section, making sure to change the values where indicated:

```
Yæ^{↔ã~^↑æ^\ŸÁ
ĔŠŮŮÓĔUÁKÁb↔^&→æÁ
ĔŠŮŮÓĔŽŠUŮĚÁKÁJbb↔ãÁ~àÁ]~|ãÁã~|\æãLÁ
ĔŠŮŮÓĔŽŠUPÁKÁJ*b←Á|bæãÁà~ãÁ}*áGÁ~^Á]~|ãÁã~|\æãL
```

## Installing Ubuntu on the system

The SUT should be installed with the **release version** of the ISO appropriate to the release being tested.

This means if a SUT is to be certified with Ubuntu Desktop 12.04, the ISO used to install the system should be the same ISO used at release time.

If it is determined that updates are necessary to successfully perform testing, those updates can be applied at that time. Until then, the installation should be without updates.

When installing Ubuntu, you should install using installer defaults as much as possible. The following are some exceptions:

Network Config:

Ubuntu defaults to DHCP for network config during installation. If the Test Environment does not utilize DHCP, then you will need to configure the network appropriately with the correct IP Address, Netmask, Gateway , Proxy and DNS information.

## Installing the Checkbox package

To install the client certification packages from the copied tarball, perform the following steps on the system under test:

1. Insert the USB drive on which you placed the tarball.
2. Extract the contents of the .tar.gz file from the USB stick to a temporary directory (such as /tmp/):

```
~ ĦF!7#f@d#MMjCd !l rzi Vi bh !%&$(" !XyJhdUaX* ('ĦF[n
```

```
.
```

```
~ W#f@d
```

```
.
```

3. Look for a directory whose name begins with **UĦfYdc** and switch to it (note this is just an example, your exact directory name may be different):

```
~ .
```

```
UĦfYdc!i Vi bh !%&$(" !XyJhdUaX* (!%&Q)!MMjCd !WĦZMĦjcd!XyJhd!$%)`
```

```
.
```

4. Use a provided helper script to add a local package repository:

```
~ g Xc"!UXScZZjPVSfYdbjcfni`
```

5. Install checkbox-certification-client:

```
~$ g XcLbH[Yh]bgU` WwJAd !WfH?Mfcb!VfMch
```

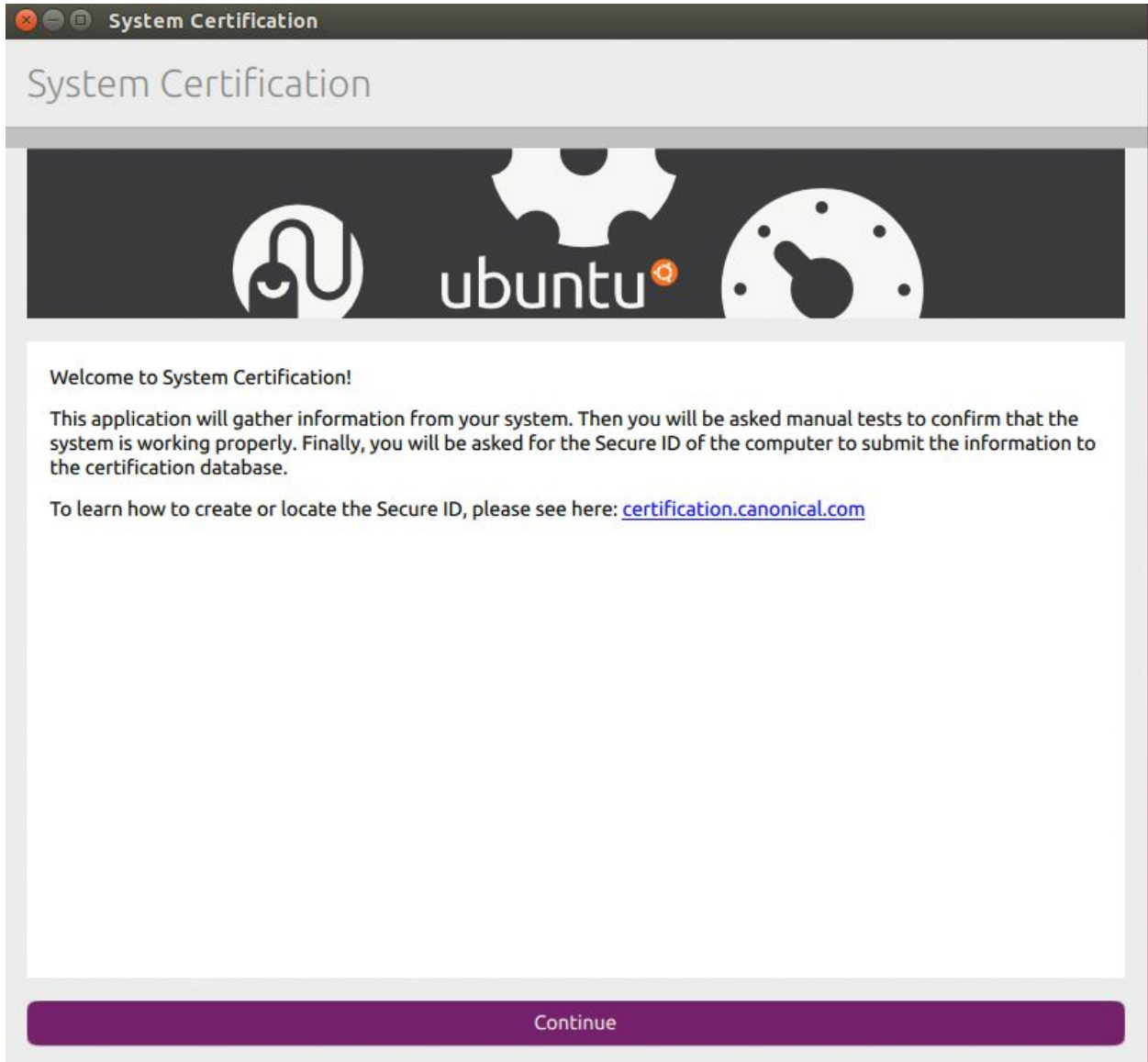
If your SUT does have internet access, you can install the latest stable version of the packages from our PPA. To install the client certification packages from the Hardware Certification Public PPA, perform the following steps on the system under test:

```
%$ ~$ g XcUx!LbHfYdbg]cfnabLU Xk UFY!WfH?Mfcb#d V]W
&' ~$ g XcLbH[Yri dMH
' "" ~$ g XcLbH[Yh]bgU` Wbcb]M!WfH?Mfcb!VfMch
```

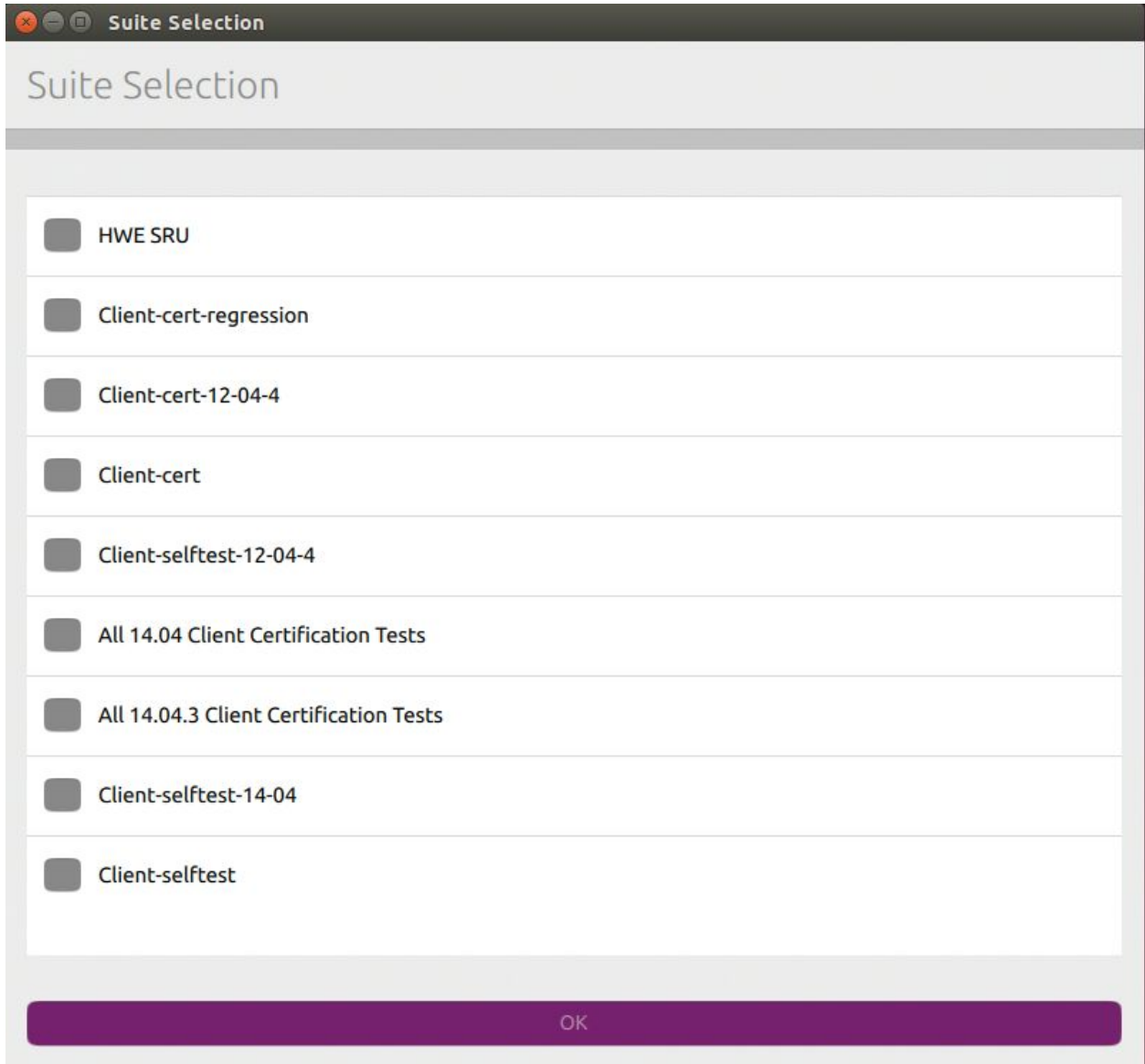
## Running the Certification Tests

Before testing you must ensure that all network devices are configured including ethernet (static or dhcp) for your test environment. Remember to keep external hardware such as a USB key and blank CD-R and DVD-R on hand for the tests that require those devices and media.

Open a terminal and run 'canonical-certification-client'. The first screen you will see is the Welcome screen and it will look like the following image.



Be sure to read the welcome message and pay attention to its instructions. The Welcome message may not appear exactly as shown above because we are constantly improving the internal messaging to ensure a better testing experience. Press the 'Continue' button. The testing application will now present you with a selection of test suites to be run. Select "Client-selftest-14-04".

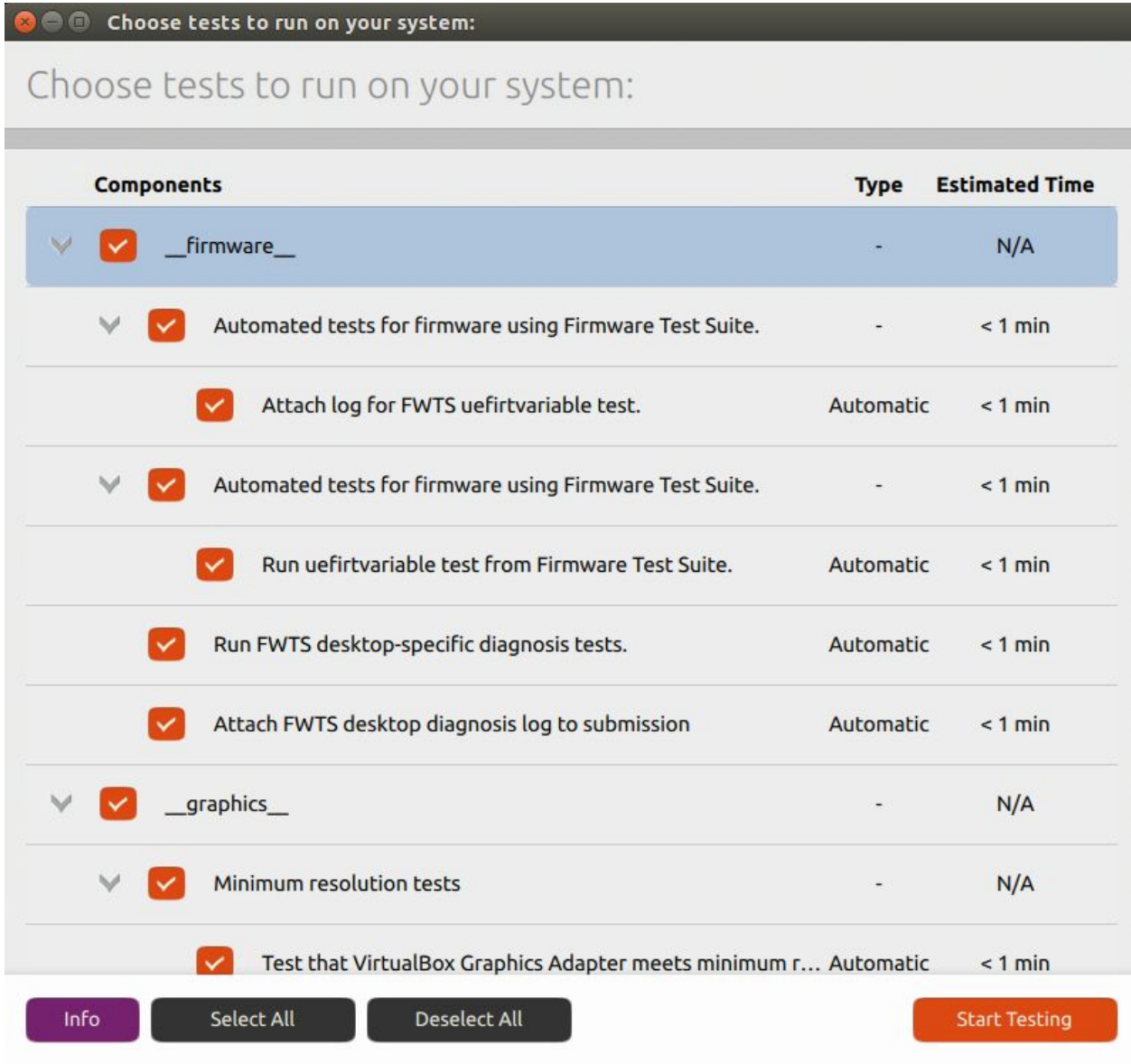


The testing application will now begin to gather information about your system. This step could take up to a minute or two, depending on your hardware. This information will be used later by the test cases to decide whether they need to be executed or not based on what has been detected in your system. Once complete, Checkbox will advance to the Test Selection screen.

Also, note that during the Information Gathering phase, you may be prompted to enter your user password. This is because some tests in Checkbox require root privileges to properly execute.

Your password will only remain for the testing session and will be neither stored nor transmitted in the test results. Once the hardware information has been gathered, a list with all the available test suites will be displayed.

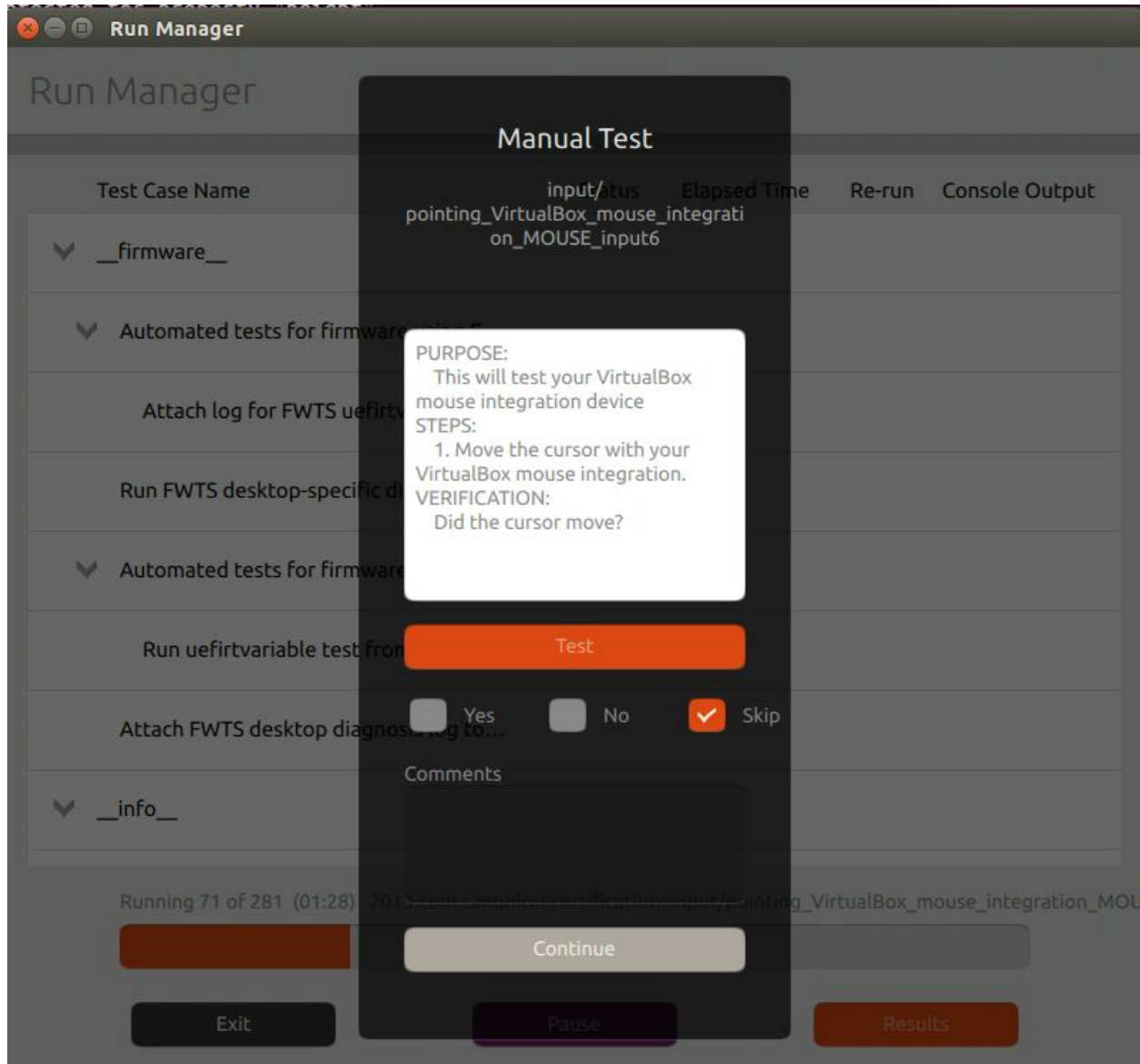
Do not deselect any of the tests unless instructed to. If results are submitted to the certification site with required tests missing then a certificate may be rejected.



If you wish, you can click the Arrow icon next to any name in the list to see which individual tests are included in that test suite.

Checkbox contains two types of tests. Manual and Automated. Manual tests may be one of three different types.

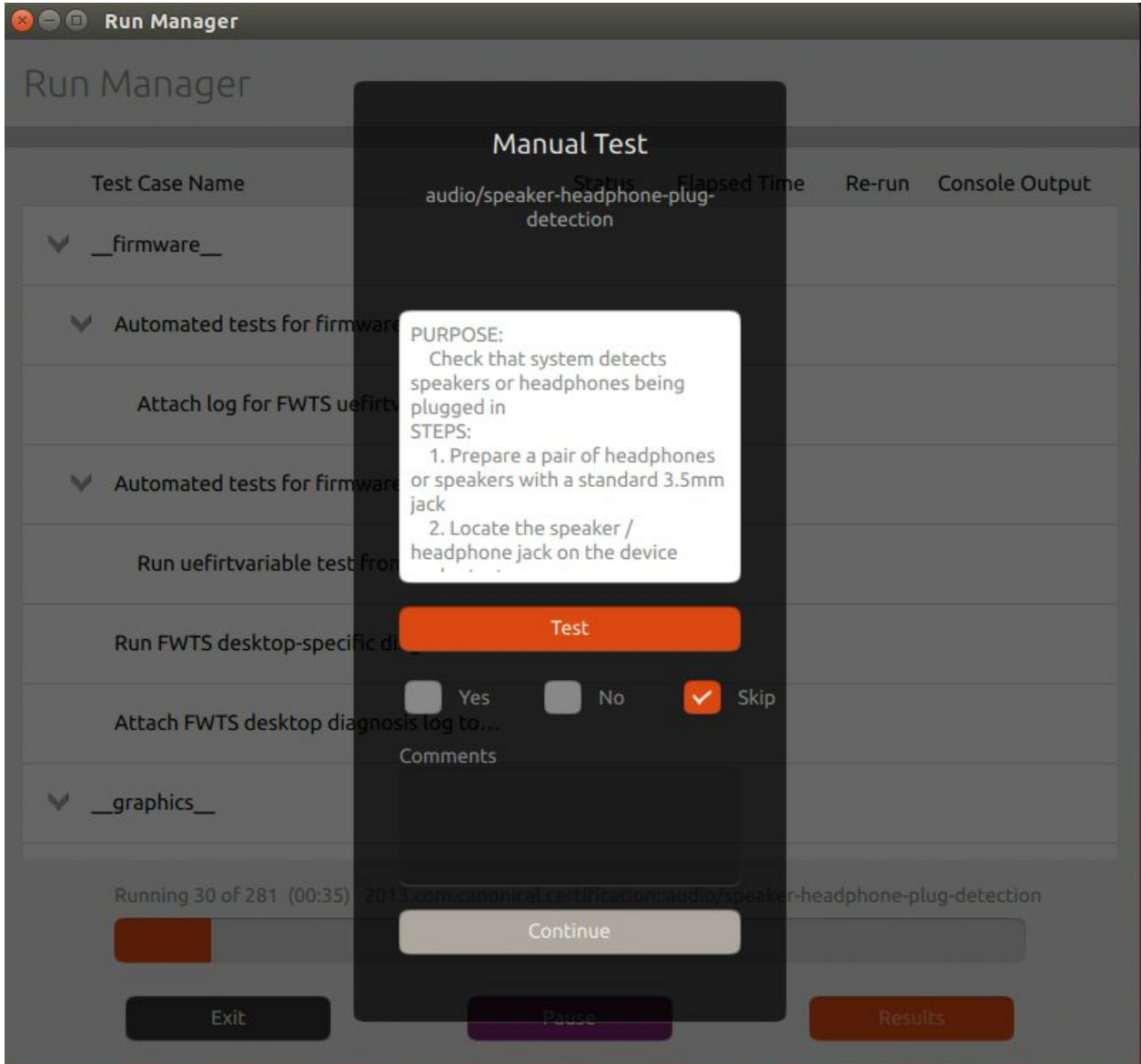
There are manual tests that completely rely on the tester to perform some action. An example is the pointing device test that simply instructs the user to move the pointing device around and perform some click actions to verify the device works.



There are also manual tests that launch an external tool that will perform the test work but require the tester to possibly initiate the test activity and/or verify the results after the test completes. An example of this test would be the audio\_playback tests. This test asks the tester to click Test, launching a script that plays back a tone. The user is then asked to

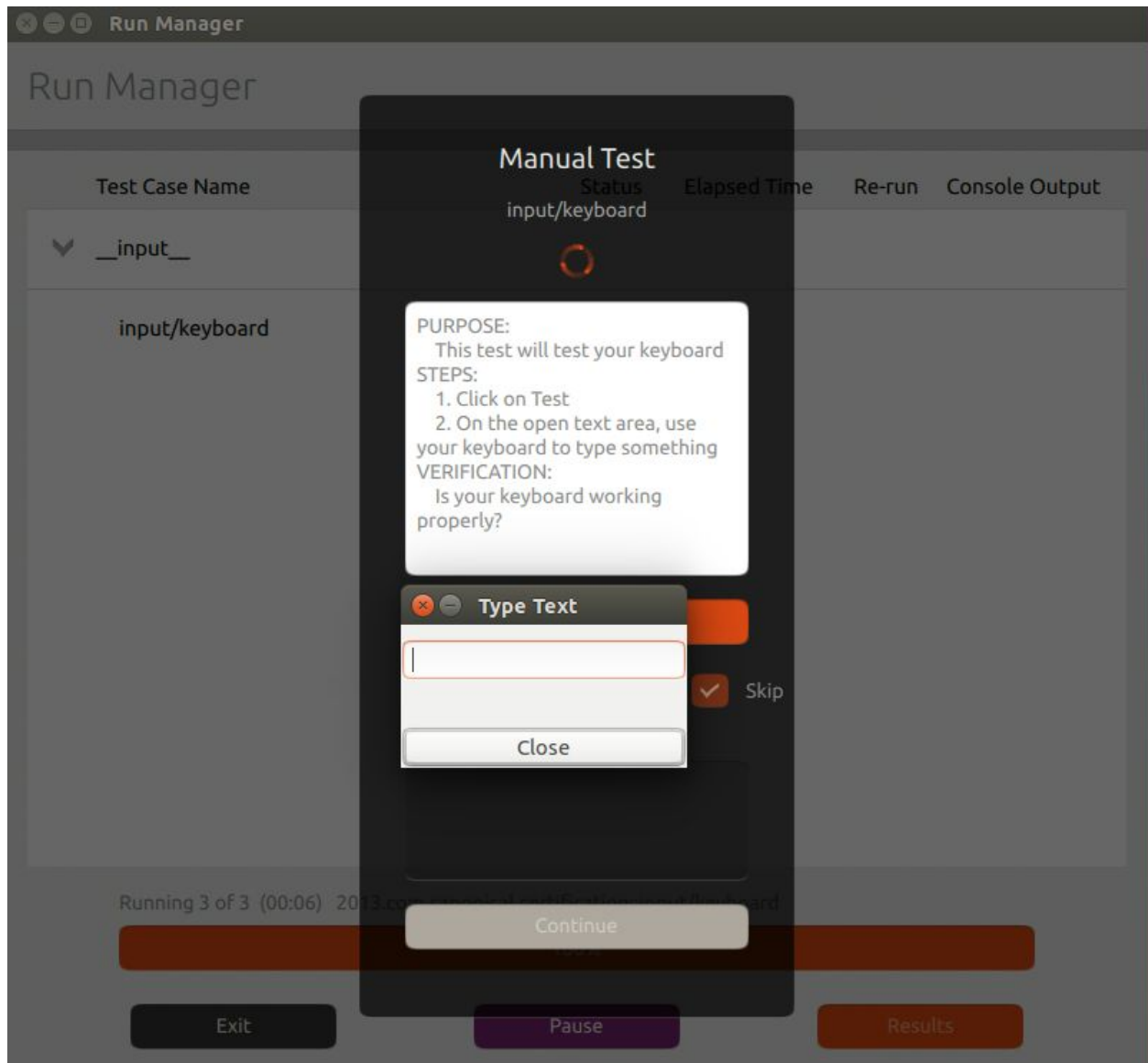


verify that the tone was audible and clear.



# CANONICAL

The Third type is a manual test that launches an interactive tool requiring the user to perform some action. A good example of this is the Hot Keys test. This test launches an interactive tool that asks the tester to press several media hot keys (skip back, skip forward, play and stop). As the tester presses each button, the tool indicates that it sees or did not see each keypress.

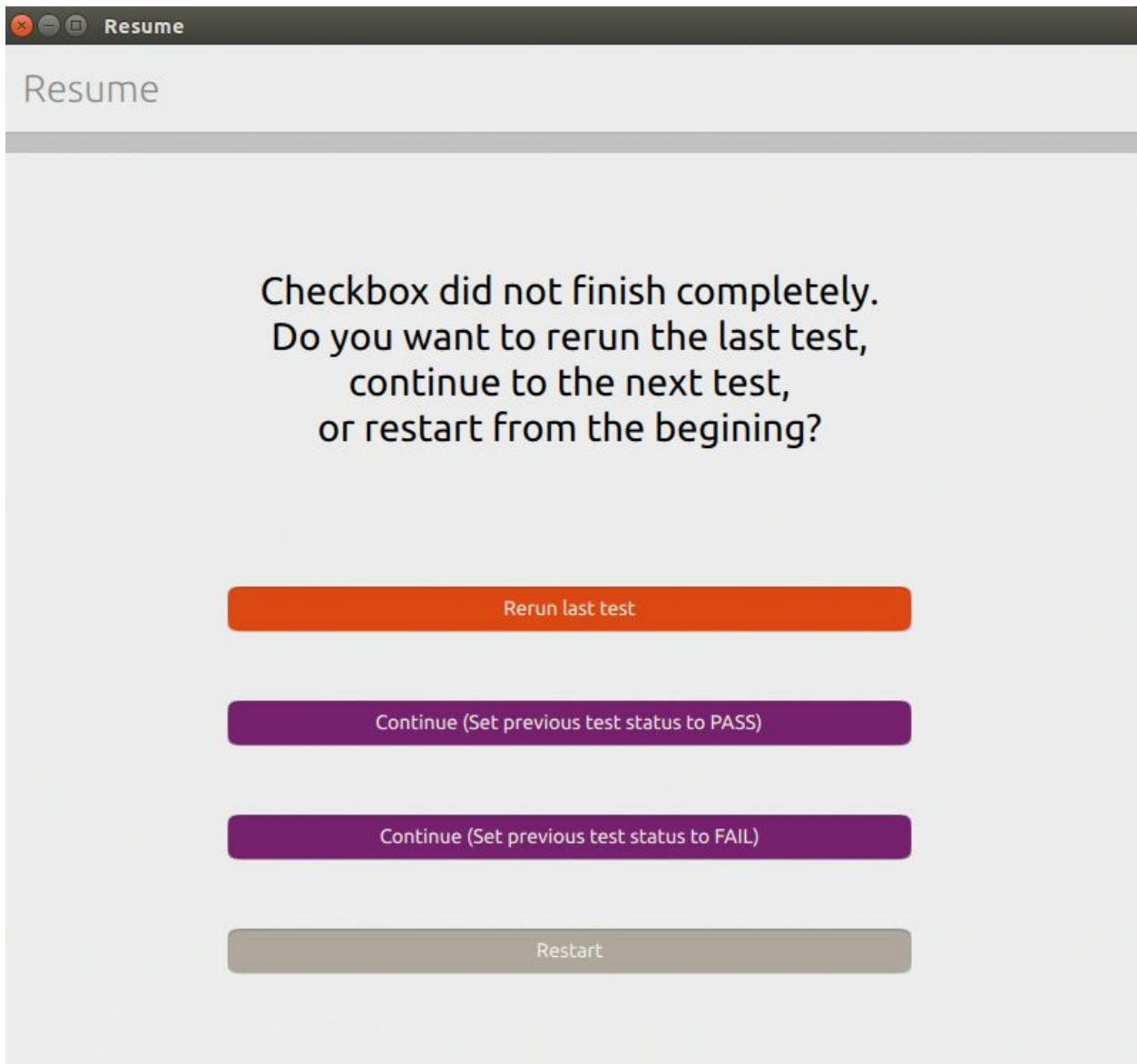


After finishing the each test, ensure that Checkbox has selected a result or that you have selected the appropriate result if instructed.

The next type of test is the Automated test. These tests are non-interactive and will just run. When they run, the UI should mostly grey out and there will be a progress indicator telling you which test is running.

There are some tests that can either cause checkbox or the system to crash (if there are hardware/OS issues). These tests usually involve Suspend or Hibernate and resume. On some systems, the memory or cpu stress tests could cause a crash as well as they are pretty intense tests. Additionally there are poweroff and reboot tests that will require you to restart Checkbox when they have completed.

To do this, you simply restart Checkbox exactly as you initially started it from a terminal at the beginning of your test run. When Checkbox restarts, you will see a prompt asking you what you want to do. There are four options here:



**Restart:** This option will delete all past progress and restart as though you were just

running Checkbox for the first time. **Choosing 'Restart' will cause you to lose your progress.**

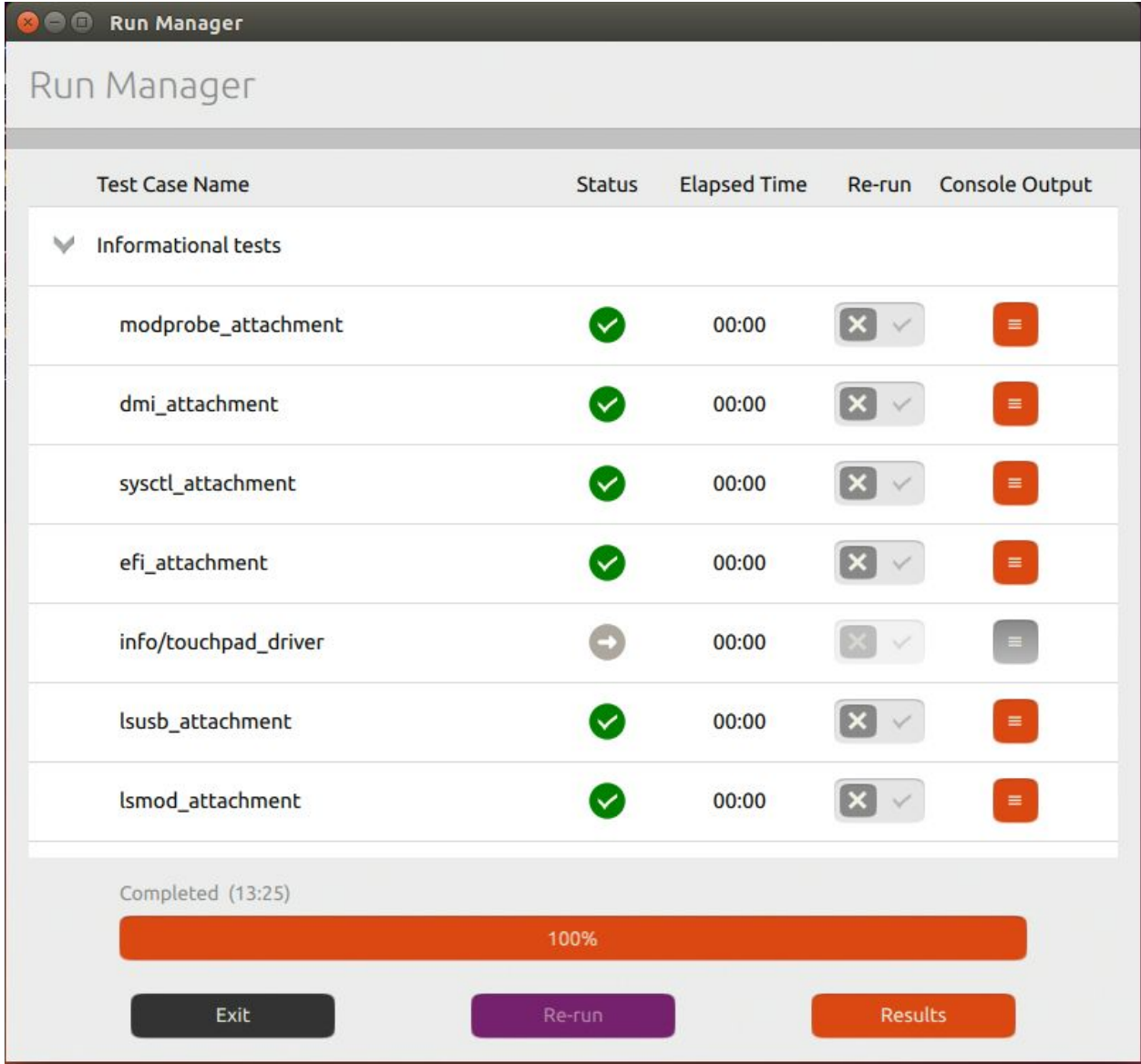
**Rerun last test:** The Rerun option will start you at the previous test. This is especially useful if you just ran a test like Poweroff or Reboot and you want to enter the result before moving on. This is also useful if the system crashes during a test and you want to re-run that test again to verify the crash was due to testing and is repeatable and not a random event.

**Continue (Set previous test status to PASS):** This will mark the previous test as passed and move on to the next test.

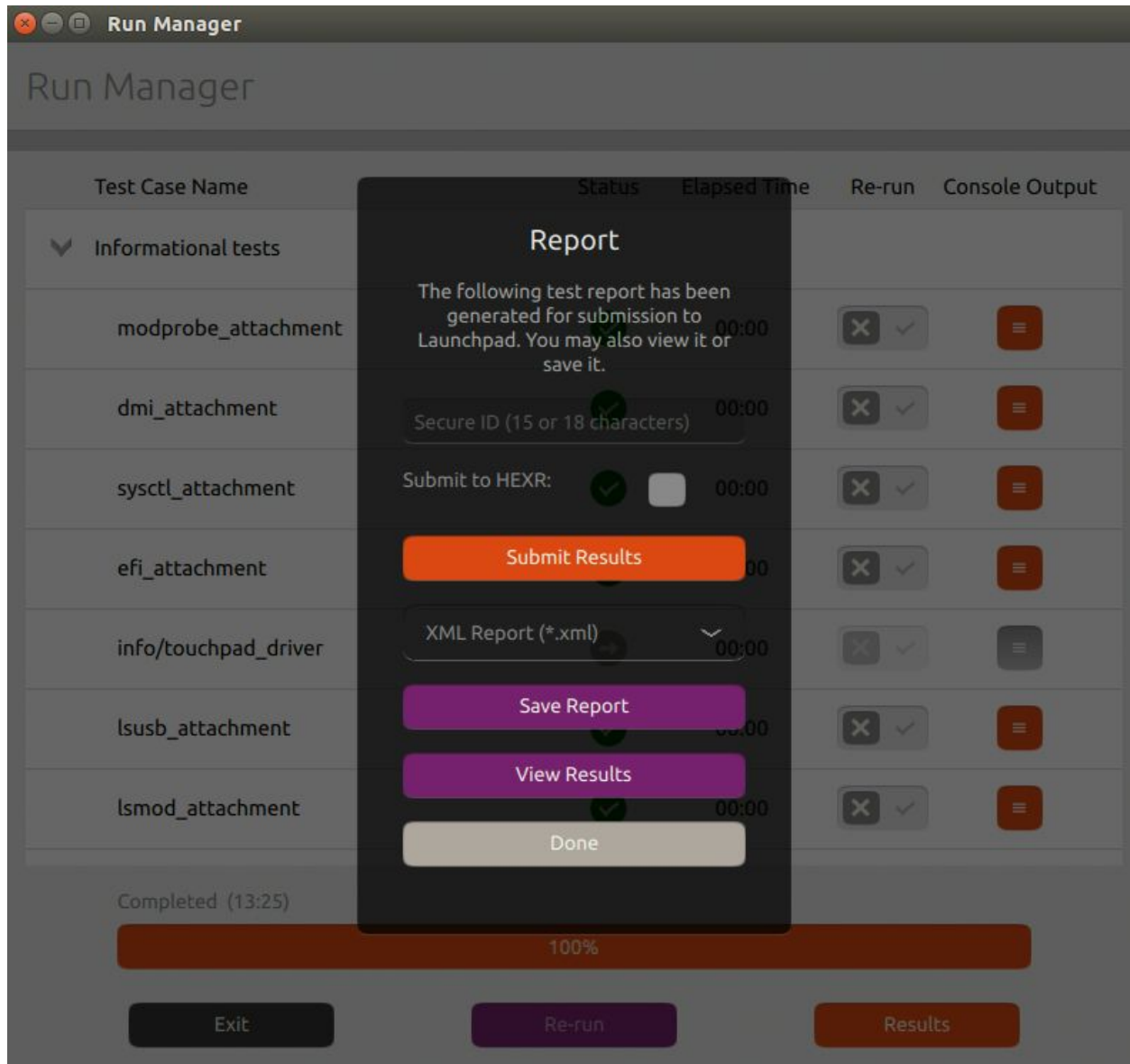
**Continue (Set previous test status to FAIL):** Choosing this option will cause Checkbox to mark the last test as FAIL and move on to the next un-run test. This is especially useful if an automated test causes a crash as automated tests are not interruptible. Using Continue in this case will bypass the test causing the crash allowing you to continue testing.

Once you have selected a restart option, checkbox will perform Information Gathering once more, and you'll again see the Test Selection screen. You do not need to do anything at this point but click Start Testing to begin from your selected restart point.

Once all tests have been run, Checkbox will advance to a run overview screen, where you can choose to re-run any tests, and check the console output of tests as well as their duration.



Selecting "Results" will bring you to the results screen.



From this screen, you can view the results in either a web browser or spreadsheet, and submit results to [certification.canonical.com](https://certification.canonical.com).

To view the results in a web browser, Click either the View Results button or the View Report hyperlink. This will launch the system default web browser and display the test results in system info in a nicely formatted presentation.

## System Testing Report

### Hardware Information

- ▶ Desktop Management Interface information
- ▶ sysfs-attributes
- ▶ Processors

### Software Information

- ▶ Packages Installed

Installed version of Ubuntu

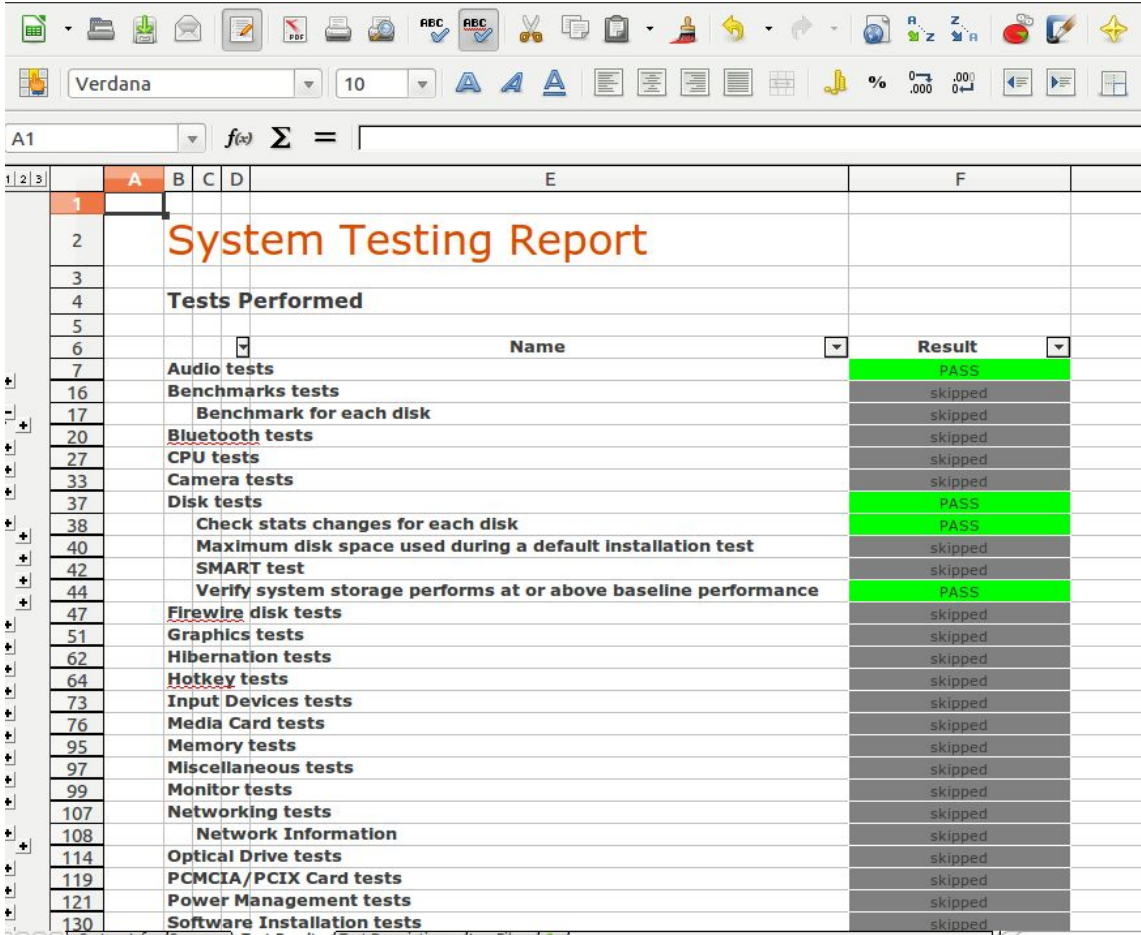
```
release 12.04
codename precise
distributor_id ubuntu
description Ubuntu 12.04 LTS
```

### Tests Performed

#### Tests

Name	Result	Comment
audio/alsa_info_collect	FAILED	Your ALSA information is in /home/bladern/.checkbox/alsa_info.log
audio/alsa_devices	FAILED	[ Intel ] HDA-Intel - HDA Intel HDA Intel at 0x2520000 irq 45 29 [ ThinkPadEC ] ThinkPad EC - ThinkPad Console Audio Control ThinkPad Console Audio Control at 0C reg 0x30, hex 60HT28WV-1.09
audio/alsa_record_playback_usb	FAILED	
audio/playback_auto	FAILED	
audio/alsa_record_playback_internal	uninitiated	
audio/playback_headphones	FAILED	
audio/alsa_record_playback_external	FAILED	
audio/playback_hdmi	FAILED	
benchmarks/disk/hdparm-read_sda	FAILED	
benchmarks/disk/hdparm-cache-read_sda	FAILED	
bluetooth/detect_output	not required on this system	job requirement not met: 'device.category == "BLUETOOTH"'
bluetooth/audio	FAILED	
bluetooth/browse_files	FAILED	
bluetooth/file-transfer	FAILED	

To view the results in a spreadsheet, click the Spreadsheet Report hyperlink. This will open the system default spreadsheet (most likely LibreOffice) and you'll be able to review system information and test results in a variety of tabs.



The screenshot shows a LibreOffice spreadsheet with a toolbar at the top and a formula bar. The spreadsheet content is as follows:

	A	B	C	D	E	F
1						
2		<b>System Testing Report</b>				
3						
4		<b>Tests Performed</b>				
5						
6					<b>Name</b>	<b>Result</b>
7		<b>Audio tests</b>				PASS
16		<b>Benchmarks tests</b>				skipped
17		<b>Benchmark for each disk</b>				skipped
20		<b>Bluetooth tests</b>				skipped
27		<b>CPU tests</b>				skipped
33		<b>Camera tests</b>				skipped
37		<b>Disk tests</b>				PASS
38		<b>Check stats changes for each disk</b>				PASS
40		<b>Maximum disk space used during a default installation test</b>				skipped
42		<b>SMART test</b>				skipped
44		<b>Verify system storage performs at or above baseline performance</b>				PASS
47		<b>Firewire disk tests</b>				skipped
51		<b>Graphics tests</b>				skipped
62		<b>Hibernation tests</b>				skipped
64		<b>Hotkey tests</b>				skipped
73		<b>Input Devices tests</b>				skipped
76		<b>Media Card tests</b>				skipped
95		<b>Memory tests</b>				skipped
97		<b>Miscellaneous tests</b>				skipped
99		<b>Monitor tests</b>				skipped
107		<b>Networking tests</b>				skipped
108		<b>Network Information</b>				skipped
114		<b>Optical Drive tests</b>				skipped
119		<b>PCMCIA/PCIX Card tests</b>				skipped
121		<b>Power Management tests</b>				skipped
130		<b>Software Installation tests</b>				skipped



The screenshot shows a spreadsheet application window with a report titled "System Testing Report". The report was generated on 2012-09-16T15:34:57 on Ubuntu 12.04 amd64. The platform name is LENOVO 3626R3U. The report is structured as follows:

<b>Platform Name</b>	<b>LENOVO 3626R3U</b>
<b>BIOS</b>	6QET46WW (1.16 )
<b>Processors</b>	
<b>Chipset</b>	Intel Corporation Core Processor
<b>Memory</b>	3624 <a href="#">MiB</a>
<b>Video (on board)</b>	Intel Corporation Core Processor Integrated Graphics Controller (rev 02)
<b>Video (add-on)</b>	
<b>Video memory</b>	NA
<b>Audio</b>	Intel Corporation 5 Series/3400 Series <a href="#">Chipset</a> High Definition Audio (rev 06)
<b>NIC</b>	Intel Corporation 82577LM Gigabit Network Connection (rev 06)
<b>Wireless</b>	Intel Corporation <a href="#">Centrino</a> Wireless-N 1000 (rev 00)
<b>Bluetooth</b>	NA

**Installed version of Ubuntu**

release	12.04
codename	precise
distributor_id	Ubuntu
description	Ubuntu 12.04.1 LTS

**Packages Installed**

You can look at the checkbox-certification-client logs as well as logs generated by the various tests in the directory `~/cache/plainbox/`. It is a good idea to save this directory and logs for debugging purposes if you have run into problems during testing.

Copy these two directories to an external media and bring it with you after certifying the system. The latter directory contains a submission.xml file which is the results of the testing, the former contains logs and other files created during execution which can be used to diagnose failures.

## 5 ddYbX]l '5 '!`Hfci V`Ygl\ cc]b[ 'H]dg`

### General Debugging Information

When you encounter any issue that you would like to report, please run the following command to install the plainbox package and provide more detailed information:

```
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Áæ´á~ÁÄÖæ^æãá\↔^&Áäæâ | &&↔^&Á↔^à~ã↑á\↔~^ÄÄLLÁ*→á↔^â~[È→~&Á  
Áæ´á~ÁÄKKKKKÁOÛÚÁÒÓÐÓÁKKKKKÄÄLLÁ*→á↔^â~[È→~&Á  
Áæ´á~ÁÄÄÛUÓÐMÄÖŠUÚSNRÓÍ~ÁÁ´áæ´←â~[Á´áæ´←Ë´~^à↔&ÄÄLLÁ*→á↔^â~[È→~&Á  
Á´áæ´←â~[Á´áæ´←Ë´~^à↔&ÄLLÁ*→á↔^â~[È→~&Á  
Áæ´á~ÁÄÄÛUÓÐMÄÖŠUÚSNRÓÍ~ÁÁá*\Ë´á´áæÁ*~→↔´]Á´áæ´←â~[ÄÄLLÁ*→á↔^â~[È→~&Á  
Áá*\Ë´á´áæÁ*~→↔´]Á´áæ´←â~[ÄLLÁ*→á↔^â~[È→~&Á  
Áæ´á~ÁÄÄÛUÓÐMÄÖŠUÚSNRÓÍ~ÁÁá*\Ë´á´áæÁ*~→↔´]Á*→á↔^â~[ÄÄLLÁ*→á↔^â~[È→~&Á  
Áá*\Ë´á´áæÁ*~→↔´]Á*→á↔^â~[ÄLLÁ*→á↔^â~[È→~&Á  
Áæ´á~ÁÄÄÛUÓÐMÄÖŠUÚSNRÓÍ~ÁÁ*→á↔^â~[Áäæ{Á↔b\Á*ã~{↔äæãÄÄLLÁ*→á↔^â~[È→~&Á  
Á*→á↔^â~[Áäæ{Á↔b\Á*ã~{↔äæãÄLLÁ*→á↔^â~[È→~&Á  
Áæ´á~ÁÄKKKKKÁÓŠÆÁÒÓÐÓÁKKKKKÄÄLLÁ*→á↔^â~[È→~&Á
```

### Issues during testing

The testing process should be straightforward and complete without issue. Should you encounter issues during testing, please contact your TAM. Be sure to save the .cache/plainbox/session/<SESSION\_DIR>/ directory as that will contain logs and other data that will help the Hardware Certification Team determine if the issue is a testing issue or a hardware issue that will affect the certification outcome. <SESSION\_DIR> will look like "pbox-<UUID>.session", as there can be more than one session directory, please find the one that's related to current submission.

If possible, please also save a copy of any terminal output or tracebacks you notice to a text file and save that along with the aforementioned session directory and the plainbox.log generated in "General Debugging Information" section.