

SETTING UP OPENQA TESTING FOR GNOME

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FOSDEM 2023



ABOUT ME

ABOUT GNOME

GNOME is a graphical desktop environment with an open development model.



GNOME IS OLDER THAN ...



(2000)



(2004)



(2005)



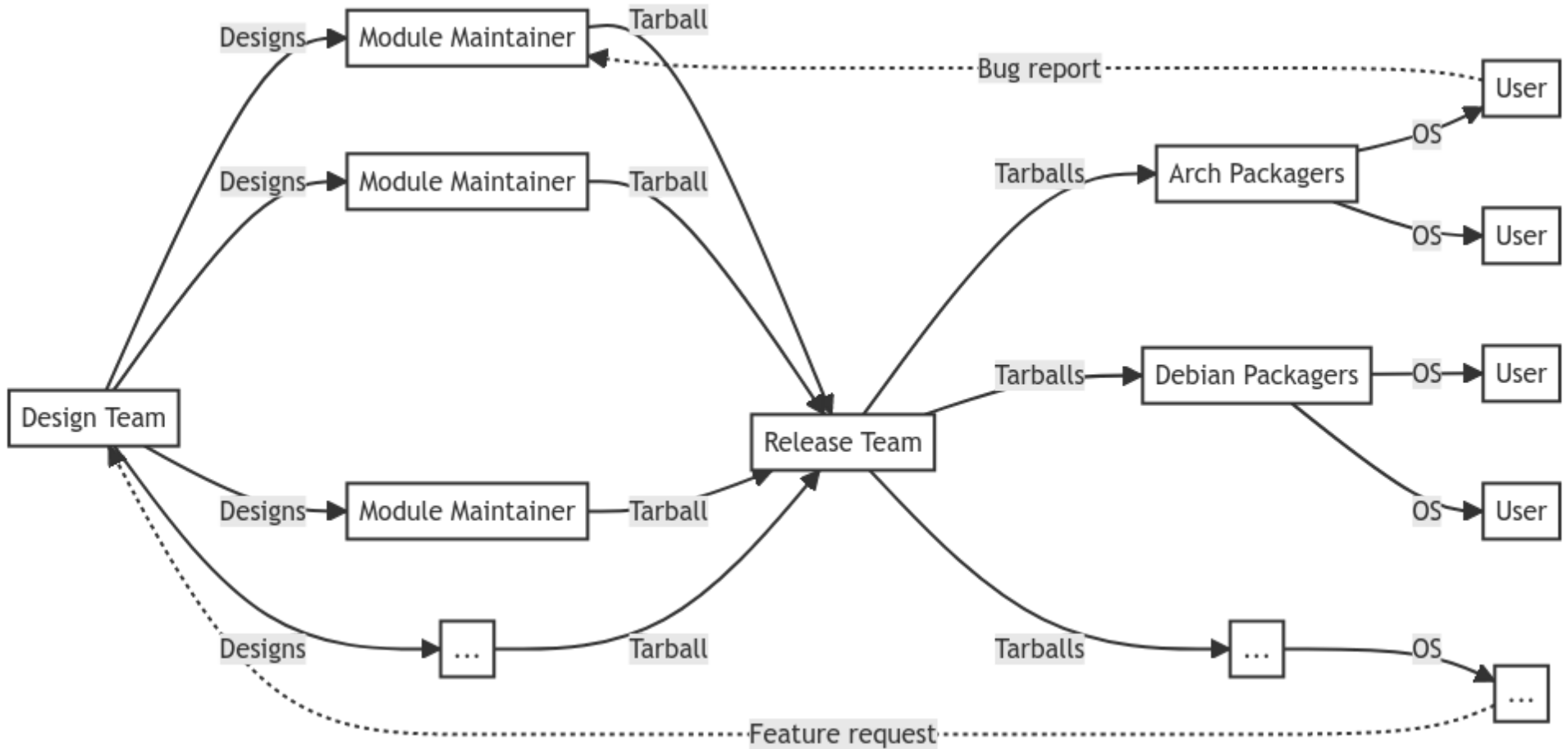
(2005)

GNOME IS HARD TO TEST

- Designed as a whole
- Released as a kit of parts (200+ modules)



Who is responsible for integration testing?



Release process, 1999

 **Maintainer:** *"It works on my machine!"*

 **Release team:** *"It builds... ship it!"*

 **Distributions:** *"A new upstream release - ship it!"*

 **Users:** Time to test if anything works...



Many "bugs" appear at integration time.

TIME PASSES

- New **build tools** (*jhbuild, Meson, BuildStream, ...*)
- New **collaboration tools** (*Git, Gitlab, ...*)
- **CI** becomes practical



Release process, 2023

 **Maintainer:** Review merge requests, check tests

 **Release team:** Update and check integration repo ([gnome-build-meta](#))

 **Distributions:** Downstream regression testing

  **Users:** Friendly messages thanking volunteers for their hard work

There's still a large gap between 'main' branch and distro releases.

What if GNOME had its own distro built from 'main' branches?

GNOME OS

Part of the "Testable" initiative (*OSTree, GNOME Continuous, gnome-build-meta, ...*)

Goals:

- Provide a "known good" full system integration
- Allow designers and developers to test in-progress changes
- Automated regression testing

Non-goals:

- Reliability
- Security updates, hardware enablement, user support

GNOME OS Nightly

Try the latest and greatest GNOME software
in a VM or on real hardware



<https://os.gnome.org>

GNOME OS

Only a few people test GNOME OS today.



Building an OS image takes **several hours**.

How can we catch complex regressions *before* releasing tarballs?

OpenQA

Initial commit in 2010.

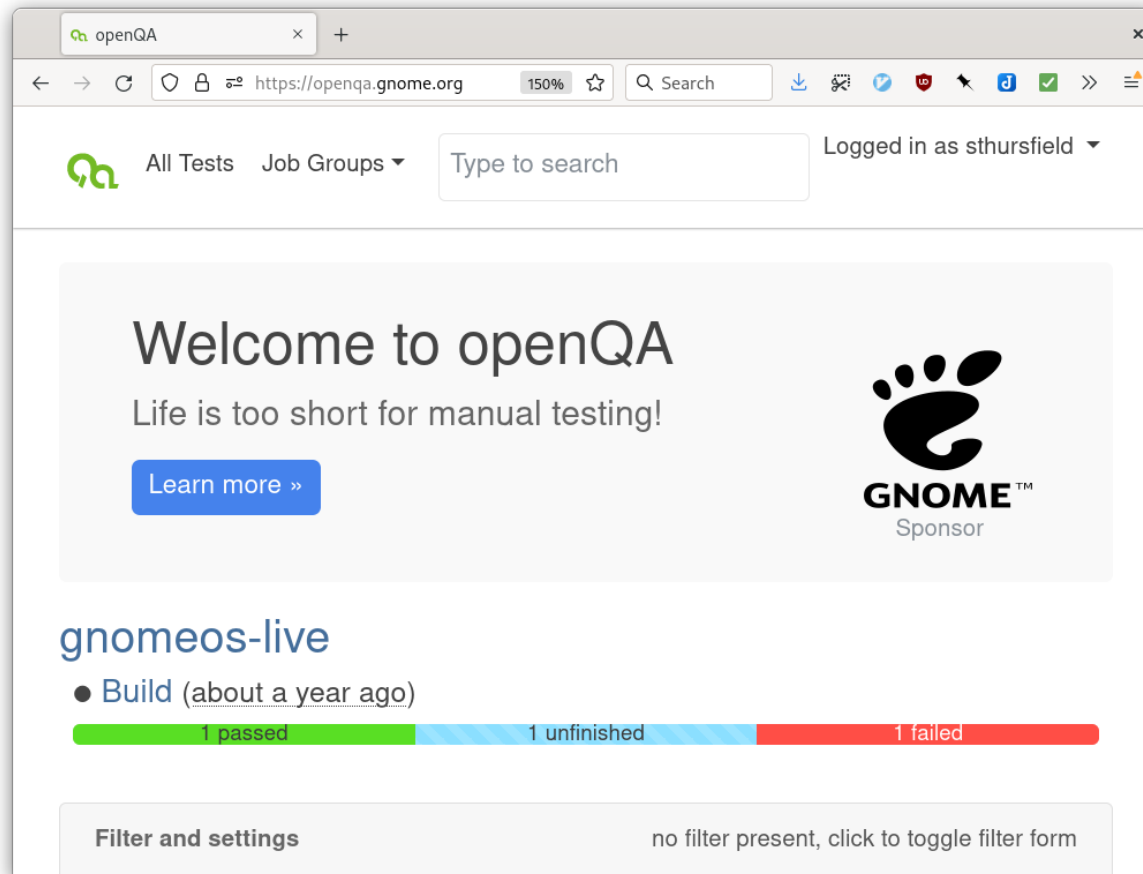
Components:

- **Web interface** ([OpenQA](#))
- **Test driver** ([os-autoinst](#))
- **Test library** ([os-autoinst-distribi-opensuse](#))

WHO USES OPENQA?

- OpenSUSE (<https://openqa.opensuse.org/>)
- Fedora (<https://openqa.fedoraproject.org/>)
- EuroLinux (CentOS derivative)
- Codethink (<https://openqa.qa.codethink.co.uk/>)
- Various Codethink clients in automotive industry
- ...you?

OpenQA: main page



The screenshot shows a web browser window with the URL <https://openqa.gnome.org>. The page features a navigation bar with the OpenQA logo, "All Tests", "Job Groups", a search box, and a user login status "Logged in as sthursfield". The main content area includes a "Welcome to openQA" message with the tagline "Life is too short for manual testing!" and a "Learn more" button. To the right is the GNOME logo with the text "GNOME™ Sponsor". Below this, a section for "gnomeos-live" shows a "Build (about a year ago)" with a progress bar indicating "1 passed", "1 unfinished", and "1 failed". At the bottom, there is a "Filter and settings" section with the text "no filter present, click to toggle filter form".

<https://openqa.gnome.org>

Gitlab: gnome-build-meta repo

The screenshot shows the GitLab web interface for the `gnome-build-meta` repository. The browser address bar shows `https://gitlab.gnome.org/GNOME/gnome-build`. The repository page includes the following information:

- Repository name: `gnome-build-meta` (Project ID: 456)
- Statistics: 2,912 Commits, 361 Branches, 82 Tags, 185.8 GB Project Storage
- Description: The GNOME Build Metadata repository is where the GNOME release team manages build metadata for building the GNOME software stack.
- Current branch: `master` (selected), `gnome-build-meta` (selected)
- Buttons: Find file, Web IDE, Clone
- Recent commit: `Update element refs` by Abderrahim Kitouni, authored 2 days ago, commit hash `c55ea226`.
- Files: README, MIT License, CI/CD configuration, Add CHANGELOG, Add CONTRIBUTING
- Table of recent commits:

Name	Last commit	Last update
<code>.gitlab-ci</code>	ci: Use new cache server	2 months ago
<code>elements</code>	Update element refs	2 days ago

Gitlab: gnome-build-meta wiki

The screenshot shows a web browser window displaying a GitLab wiki page. The browser's address bar shows the URL `https://gitlab.gnome.org/GNOME/gnome-build`. The page title is "OpenQA for GNOME developers". The content includes a paragraph about using OpenQA for testing GNOME OS images, a list of links to documentation (starter guide, tests developer guide, users guide), and a section titled "Checking test results" with two numbered steps. The first step points to a pipeline URL: `https://gitlab.gnome.org/GNOME/gnome-build-meta/-/pipelines?page=1&scope=all&ref=master`. The second step is "Open the 'test-s3-image' job:". The right sidebar contains a list of repository links including "Clone repository", "Edit sidebar", "Bootable images in virtual machines", "Home", "Infrastructure", "Pinebook Pro image", "Pinphone image", "Release Contents", "deploy components ostree", "openqa" (with sub-items "Deployment" and "OpenQA for GNOME developers"), and "risc v".

OpenQA for GNOME developers

Last edited by **Sam Thursfield** 2 days ago Page history New page

OpenQA for GNOME developers

Using OpenQA we can install the nightly GNOME OS images in a virtual machine, and simulate user interactions to test that it boots to a working graphical desktop. We can then do more integration testing of GNOME as a whole via the Shell and the core applications.

OpenQA has some useful online documentation. Be sure to look at the [starter guide](#), [tests developer guide](#) and [users guide](#).

Deployment of `openqa.gnome.org` is documented [here](#).

Checking test results

1. Look at the latest 'master' pipelines for `gnome-build-meta`:
<https://gitlab.gnome.org/GNOME/gnome-build-meta/-/pipelines?page=1&scope=all&ref=master>
2. Open the 'test-s3-image' job:

--

Clone repository
Edit sidebar

Bootable images in virtual machines

Home

Infrastructure

Pinebook Pro image

Pinphone image

Release Contents

deploy components ostree

openqa

- Deployment
- OpenQA for GNOME developers

risc v

Gitlab: s3-image

The screenshot shows the GitLab Pipelines interface for the repository GNOME/gnome-build. The page displays a list of pipeline runs with columns for Status, Pipeline, Triggerer, and Stages. A dropdown menu is open over the 's3-image' job in the third pipeline run, showing a list of jobs: vm-image-x86_64, cve_report, deploy-flatpak, ostree-x86_64, pages:deploy, and s3-image. A tooltip 's3-image - passed' is visible over the 's3-image' job in the pipeline run below.

Status	Pipeline	Triggerer	Stages
failed	Update element refs #478097 master c55ea226 latest	[Avatar]	[failed] [passed] [passed] [passed] [passed]
passed	Publish the "extra" Mesa extensi... #478079 master ac809ef4	[Avatar]	[passed] [passed] [passed] [passed] [passed] [passed]
passed	Run OpenQA tests against s3-im... #477874 master 99f34804	[Avatar]	[passed] [passed] [passed] [passed] [passed] [passed]
passed	core/gnome-remote-desktop: A... #477753 master 6b07fc2b	[Avatar]	[passed] [passed] [passed] [passed] [passed] [passed]
passed	Remove obsolete BST_TRACK_T... #477731 master 11e9e3c5	[Avatar]	[passed] [passed] [passed] [passed] [passed] [passed]

vm-image-x86_64
cve_report
deploy-flatpak
ostree-x86_64
pages:deploy
s3-image

s3-image - passed

https://gitlab.gnome.org/GNOME/gnome-build-meta/-/jobs/2492176

Gitlab: test-s3-image

The screenshot displays the GitLab Pipelines interface for the repository GNOME/gnome-build. The page shows a list of pipeline jobs with their status, pipeline name, triggerer, and stages. A tooltip is visible over the 'test-s3-image' job in the third pipeline, showing its status as 'passed'.

Status	Pipeline	Triggerer	Stages
failed	Update element refs #478097 master c55ea226 latest	[Avatar]	[Failed Stage]
passed	Publish the "extra" Mesa extensi... #478079 master ac809ef4	[Avatar]	[Passed Stages]
passed	Run OpenQA tests against s3-im... #477874 master 99f34804	[Avatar]	[Passed Stages]
passed	core/gnome-remote-desktop: A... #477753 master 6b07fc2b	[Avatar]	[Passed Stages]
passed	Remove obsolete BST_TRACK_T... #477731 master 11e9e3c5	[Avatar]	[Passed Stages]

Stage: test

- test-s3-image (passed)
- test-pinephone-aar...
- test-pinephone-pro...

test-s3-image - passed

https://gitlab.gnome.org/GNOME/gnome-build-meta/-/jobs/2492180

Gitlab: test-s3-image

This job:

- runs using the upstream 'openqa-worker' Docker image
- downloads the ISO from S3
- creates a temporary, unique 'machine' and connects it to OpenQA
- submits a test job to OpenQA, tagging it with the unique machine ID
- starts the 'run_worker' script in bg, and waits for the job
- polls job status report until its passed/failed
- job runs, against the locally downloaded ISO, and passes or fails
- removes the machine again and pipeline exists

OpenQA: Test results

The screenshot shows a web browser window with the OpenQA interface. The browser's address bar shows the URL `https://openqa.gnome.org/tests/`. The page header includes the OpenQA logo, navigation links for "All Tests" and "Job Groups", a search bar with the placeholder "Type to search", and a user login status "Logged in as sthursfield".

The main content area displays the results for a specific test job: "Results for gnomeos-master-iso-x86_64-gnomeos@qemu_x86_64" with a score of 32 stars. The test result is "passed", finished 6 days ago (06:39 minutes). The scheduled product is "gnomeos-master-iso-x86_64" and the assigned worker is "runner-kc9kxhyt-project-17928-concurrent-0:1 gnome os CI".

Below the test details, there are navigation tabs: "Details", "Logs & Assets", "Settings", "Comments (0)", and "Next & previous results".

A table below the tabs shows the test results for individual components:

Test	Result	References
gnome_install 1m 28s	passed	

The browser's address bar at the bottom shows the URL `https://openqa.gnome.org/tests/457#`.

OpenQA: Test results

openQA: gnomeos-maste x

https://openqa.gnome.org/tests/ 133%

tests

gnome_install 1m 28s	passed	
gnome_welcome 43s	passed	
gnome_journal_capture_fix 1s	passed	<pre>local host testuser Password: [?200 export TERM= G18yV -0- > echo Logged Logged > sudo sh -c "echo KMPL8 -0- > sudo sh -c "echo _Ofw7 -0- > sudo systemctl UFbGZ -0-</pre>
gnome_disable_update_notification 1s	passed	<pre>> sudo rm /etc/ M5OV4 -0-</pre>
gnome_desktop 4s	passed	
app_baobab 9s	passed	

↑

OpenQA: gnome_install test

The screenshot shows a web browser window displaying an OpenQA test result for 'gnome_install'. The test status is 'passed' with a duration of '1m 28s'. The browser address bar shows 'https://openqa.gnome.org/tests/'.

Below the test status, there is a section for 'Candidate needles and tags:' with a dropdown menu set to '99%: gnome_install_disk'. To the right of this section are icons for a plus sign and a document.

The main content is a video player showing a 'Select Disk' dialog box. The dialog box has 'Previous' and 'Next' buttons. The text inside the dialog box reads: 'Select the disk you'd like to reformat with GNOME OS'. Below this, there is a 'Select Disk:' label and a dropdown menu showing 'VirtIO Disk 10.7 GB'. At the bottom of the dialog box, there is a checkbox labeled 'I agree to erasing all of my files and apps' which is currently unchecked.

Two 'Needle' annotations are visible on the video player: one at the bottom left of the dialog box and another at the bottom right, both with a '98%' confidence score.

At the bottom of the video player, there is a blue circular button with an upward-pointing arrow.

Below the video player, there is a section for 'app_epipnany' with a 'passed' status.

OpenQA: gnome_welcome test

The screenshot shows a web browser window displaying the OpenQA test results for 'gnome_welcome'. The test status is 'passed' with a duration of 43s. A grid of 14 thumbnail images shows various screenshots from the test run. Below the thumbnails, the 'Candidate needles and tags' section shows a selected needle: '100%: gnome_firstboot_aboutyou_2-20220923'. The main content area displays a 'Needle' screenshot of the 'About You' setup screen. The 'About You' screen has a progress indicator of 100% and a 'Next' button. The form fields are filled with 'testuser' for both 'Full Name' and 'Username'. A checkbox for 'Set up parental controls for this user' is unchecked. The URL at the bottom of the browser is 'https://openqa.gnome.org/tests/457#step/gnome_welcome/8'.

openQA: gnomeos-maste x +

https://openqa.gnome.org/tests/ 133% Search

gnome_welcome 43s passed

Candidate needles and tags: 100%: gnome_firstboot_aboutyou_2-20220923

Needle 100%

Previous About You Next

gnome

About You

We need a few details to complete setup.

Full Name testuser ✓

Username testuser ✓

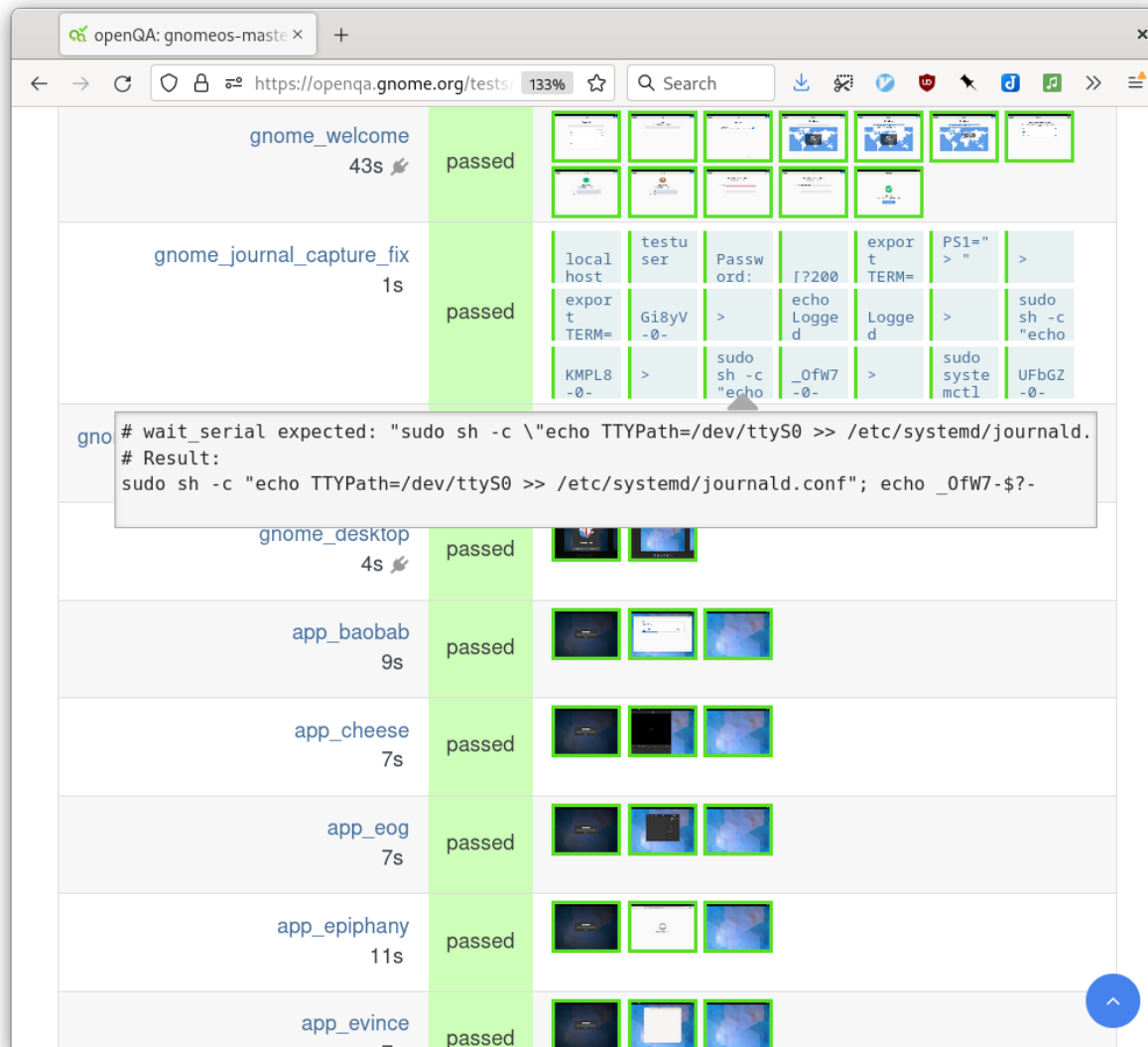
This will be used to name your home folder and can't be changed.

Set up parental controls for this user


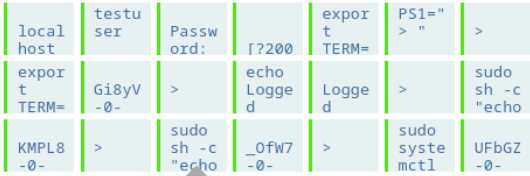


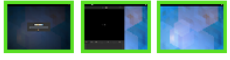



For use by a parent or supervisor, who must set up their own password.

https://openqa.gnome.org/tests/457#step/gnome_welcome/8

OpenQA: gnome_journal_capture_fix test

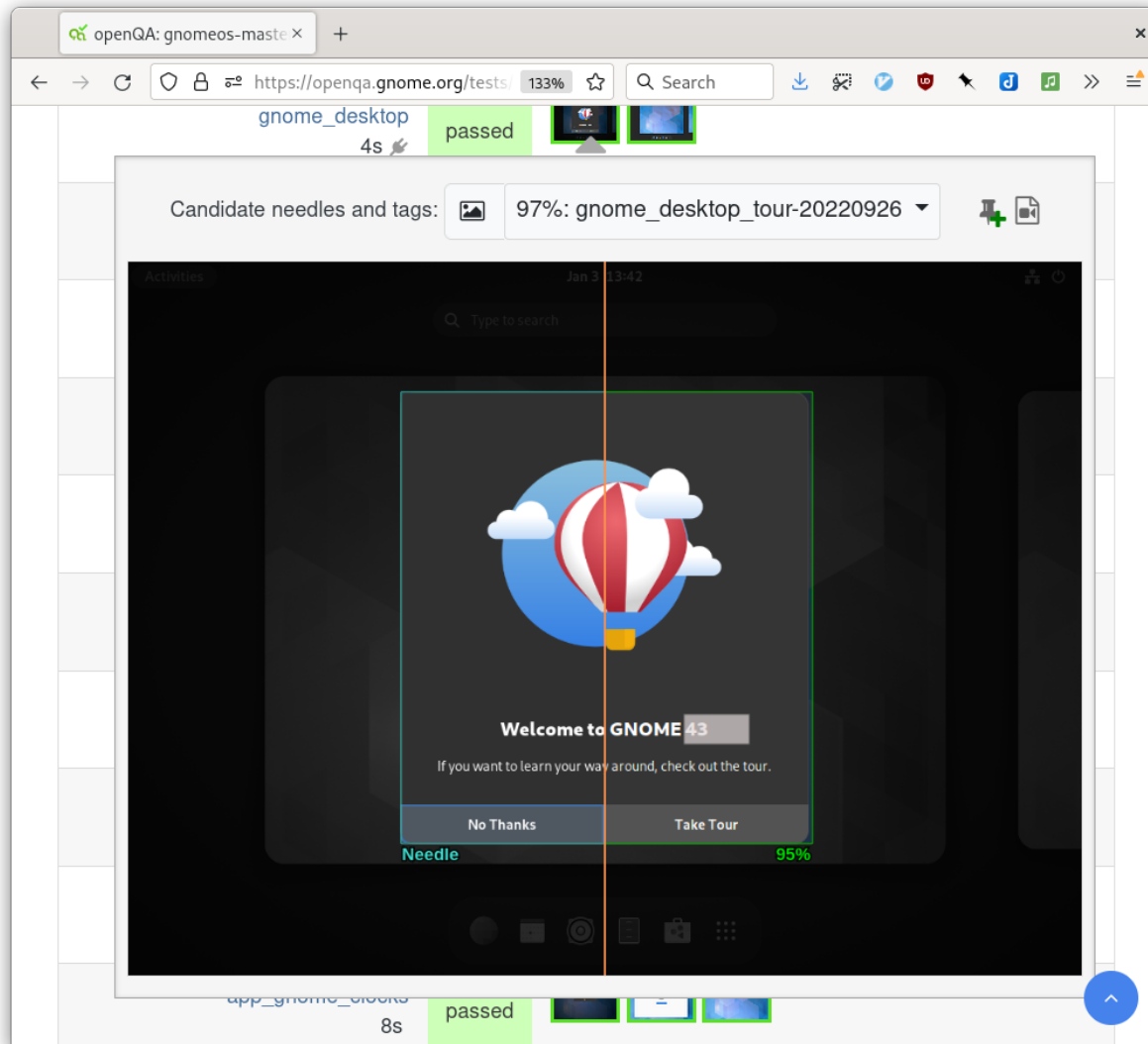


The screenshot shows a web browser window displaying the OpenQA test results for the 'gnome_journal_capture_fix' test. The test is listed as 'passed' with a duration of 1s. A terminal window is open, showing the command and its output. The command is: `sudo sh -c "echo TTYPath=/dev/ttyS0 >> /etc/systemd/journald.conf"; echo _0fw7-?-`. The output is: `sudo sh -c "echo TTYPath=/dev/ttyS0 >> /etc/systemd/journald.conf"; echo _0fw7-?-`. The terminal window is also showing the command: `sudo sh -c "echo TTYPath=/dev/ttyS0 >> /etc/systemd/journald.conf"; echo _0fw7-?-`. The terminal window is also showing the command: `sudo sh -c "echo TTYPath=/dev/ttyS0 >> /etc/systemd/journald.conf"; echo _0fw7-?-`.

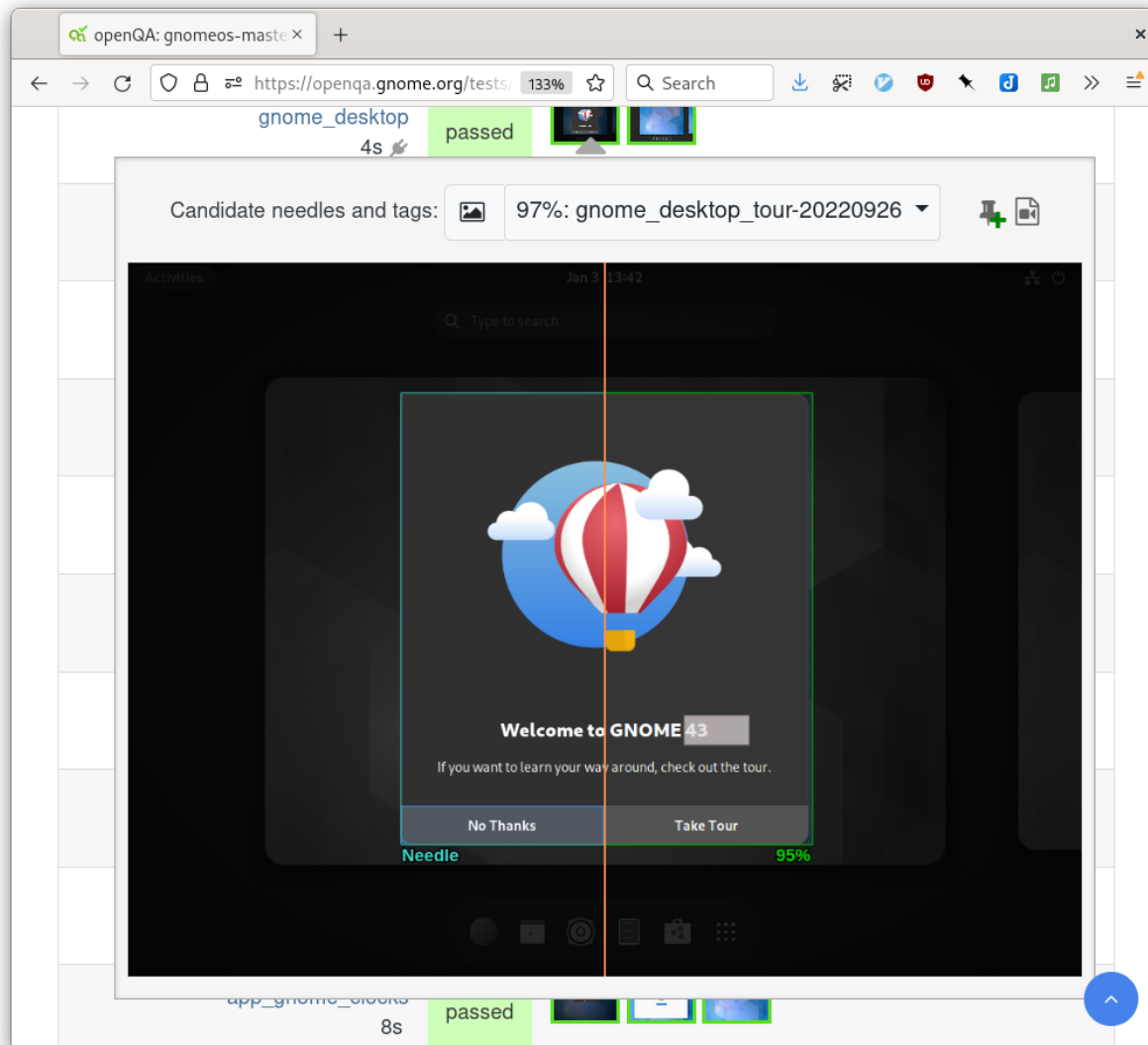
Test Name	Duration	Status	Thumbnail
gnome_welcome	43s	passed	
gnome_journal_capture_fix	1s	passed	
gnome_desktop	4s	passed	
app_baobab	9s	passed	
app_cheese	7s	passed	
app_eog	7s	passed	
app_epiphany	11s	passed	
app_evince	7s	passed	

```
gno # wait_serial expected: "sudo sh -c \"echo TTYPath=/dev/ttyS0 >> /etc/systemd/journald.conf\"; echo _0fw7-?-\"
# Result:
sudo sh -c "echo TTYPath=/dev/ttyS0 >> /etc/systemd/journald.conf"; echo _0fw7-?-
```


OpenQA: gnome_desktop test



OpenQA: gnome_system_monitor test



OpenQA: needle editor

openQA: Needle Editor

https://openqa.gnome.org/tests/457/modules/app

Screenshot and Areas

Take image from: Screenshot

Copy areas from: 100%: app_gnome_system_monitor_home Take matches

Selected area:

- Change match level
- Change margin
- Add click coordinates for `assert_and_click`

Activities System Monitor Jan 3 13:45

Process Name	User	% CPU	ID	Memory	Disk read tota	Disk writ
at-spi2-registryd	testuser	0.00	1739	700.4 kB	N/A	
at-spi-bus-launcher	testuser	0.00	1584	512.0 kB	N/A	
bash	testuser	0.00	1613	1.9 MB	1.9 MB	8
dbus-daemon	testuser	0.00	1429	1.7 MB	N/A	
dbus-daemon	testuser	0.00	1589	524.3 kB	N/A	
dconf-service	testuser	0.00	1678	647.2 kB	N/A	327
evolution-addressbook-factory	testuser	0.00	1848	2.8 MB	1.3 MB	147
evolution-alarm-notify	testuser	0.00	1823	12.5 MB	950.3 kB	
evolution-calendar-factory	testuser	0.00	1710	2.9 MB	565.2 kB	4
evolution-source-registry	testuser	0.00	1674	7.9 MB	2.2 MB	12
flatpak-portal	testuser	0.00	2405	1.8 MB	831.5 kB	
gamemoded	testuser	0.00	1398	254.0 kB	N/A	
gcr-ssh-agent	testuser	0.00	1399	630.8 kB	N/A	
gdm-wayland-session	testuser	0.00	1419	475.1 kB	N/A	
gjs	testuser	0.00	1737	4.9 MB	N/A	
gjs	testuser	0.00	1891	5.3 MB	N/A	

OpenQA: needle editor 2

The screenshot shows the OpenQA Needle Editor interface in a web browser. The browser tab is titled "openQA: Needle Editor" and the address bar shows the URL "https://openqa.gnome.org/tests/457/modules/app". The page header includes the OpenQA logo, "All Tests", "Job Groups", a search bar, and "Logged in as sthursfield".

The main content area is divided into two sections:

- Basics of Needle:**
 - Name:**
 - Needle based on:**
 - workaround** [?](#)
 - Optional commit message (leave empty for default text):**
 - Tags:**
 - app_gnome_system_monitor_home
 -
 -
- Screenshot and Areas:**
 - Take image from:** [?](#)
 - Copy areas from:** **Take matches**
 - Selected area:**
 -
 -
 -

OpenQA: openqa-needles Git repo

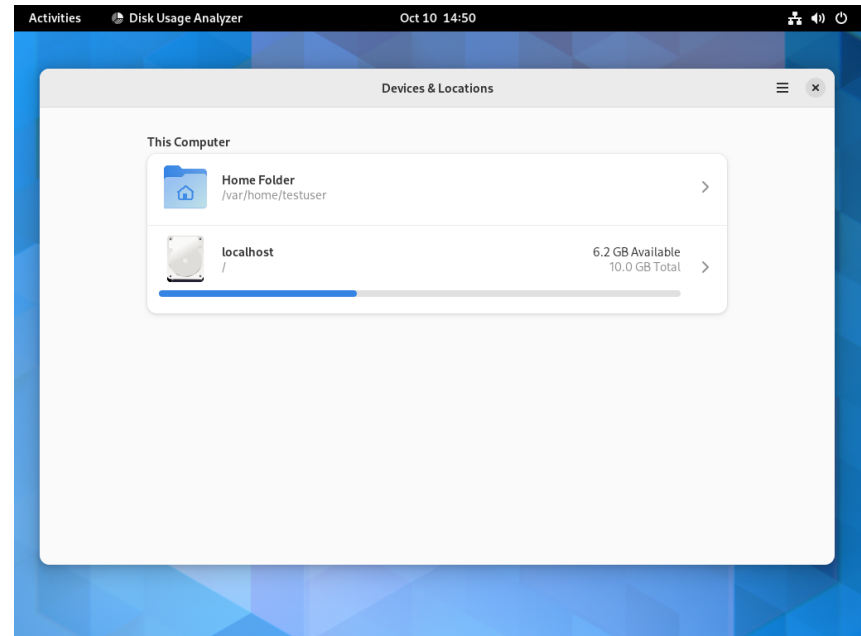
The screenshot shows the GitLab web interface for the GNOME OpenQA Needles repository. The browser address bar shows the URL `https://gitlab.gnome.org/GNOME/openqa-needle`. The repository page includes the following information:

- Repository Name:** OpenQA Needles (Project ID: 16754)
- Statistics:** 87 Commits, 1 Branch, 0 Tags, 17.2 MB Project Storage
- Current Branch:** master
- Recent Commit:** Update Nautilus for new icons by Sam Thursfield, 6 days ago (SHA: e890dc05)
- Actions:** Add README, Add LICENSE, Add CHANGELOG, Add CONTRIBUTING, Enable Auto DevOps, Add Kubernetes cluster, Set up CI/CD, Configure Integrations
- Files Table:**

Name	Last commit	Last update
app_baobab_home.json	Initial needle for Baobab	2 months ago
app_baobab_home.png	Initial needle for Baobab	2 months ago
app_cheese_home.json	Add needles for 5 GNOME apps	1 year ago
app_cheese_home.png	Add needles for 5 GNOME apps	1 year ago

OpenQA: a needle

```
{  
  "area": [  
    {  
      "xpos": 31,  
      "ypos": 78,  
      "width": 959,  
      "height": 599,  
      "type": "match"  
    }  
  ],  
  "properties": [],  
  "tags": [  
    "app_baobab_home"  
  ]  
}
```



openqa-tests.git

The screenshot shows the GitLab web interface for the GNOME OpenQA Tests project. The browser address bar shows the URL `https://gitlab.gnome.org/GNOME/openqa-tests`. The page header includes the GNOME logo and a search bar. The main content area displays the project name "OpenQA Tests" with a project ID of 17928 and a "Leave project" link. It also shows statistics: 45 Commits, 2 Branches, 0 Tags, and 2.2 MB Project Storage. A merge commit is highlighted, showing the merge of branch 'sam/update-notification' into 'master' by Sam Thursfield, 6 days ago, with commit hash 71cd5ad1. Below the merge commit, there are buttons for "README", "CI/CD configuration", "No license. All rights reserved", and "Add Kubernetes cluster". A "Configure Integrations" button is also present. At the bottom, a table lists the project's files and their last commit details.

Name	Last commit	Last update
lib	Restore journal output capture durin...	1 week ago
tests	Attempt to disable gnome-software's ...	6 days ago
utils	utils/start_job.sh: Allow overriding CA...	3 months ago
.gitlab-ci.yml	Log sha256sum of installer.iso image	1 month ago
README.md	Merge openqa tests from gnome-buil...	1 year ago
main.pm	Attempt to disable gnome-software's ...	6 days ago
openqa-tests.doap	Initial commit	1 year ago

openqa-tests/main.pm

```
my $distri = testapi::get_required_var('CASEDIR') . '/lib/gnomeos
require $distri;
testapi::set_distribution(gnomeosdistribution->new);

$testapi::username = 'testuser';
$testapi::password = 'testingtesting123';

autotest::loadtest("tests/gnome_install.pm");
autotest::loadtest("tests/gnome_welcome.pm");
autotest::loadtest("tests/gnome_journal_capture_fix.pm");
autotest::loadtest("tests/gnome_disable_update_notification.pm");
...
```


openqa-tests/tests/gnome-install.pm

```
use base 'basetest';
use strict;
use testapi;
use bootloader;

sub run {
    my $self = shift;

    bootloader_add_kernel_args(' console=ttyS0 systemd.journald.f

    assert_and_click('gnome_install_1', timeout => 120, button =>
    assert_and_click('gnome_install_disk', timeout => 10, button
    assert_and_click('gnome_install_disk2', timeout => 10, button
    assert_screen('gnome_install_reformatting1', timeout => 120);
    assert_screen('gnome_install_complete', timeout => 180);
    die "Failed to install GNOME" if $self->failed;
}
```

openqa-tests/tests/gnome-welcome.pm

```
sub run {  
    my $self = shift;  
  
    assert_and_click('gnome_firstboot_welcome', timeout => 600, b  
    assert_and_click('gnome_firstboot_language', timeout => 10, b  
    assert_and_click('gnome_firstboot_privacy', timeout => 10, bu  
    assert_screen('gnome_firstboot_timezone_1', 30);  
    send_key('tab');  
    type_string('London, East', wait_screen_change => 6, max_inte  
    ...  
}
```

TIPS AND TRICKS

1. OpenQA is great! ❤️ Use it!
2. Explore the test library code:
 - [testapi docs](#)
 - [os-autoinst-distri-opensuse](#)
3. Keep tests simple.
4. Always check the os-autoinst logs.
 - Example: If needle bounds are invalid, you get a log message and a "0% match" in web UI
5. Learn how to run the testsuite locally.
6. Take care with upstream containers - pin versions using container hash.

NEXT STEPS FOR GNOME OPENQA

1. Build a small team to maintain tests and infra.
2. Reach "production ready" state.
3. GNOME module teams maintaining & extending their own tests.
4. Add example user content (text documents, multimedia, etc)

CREDITS

Top names from gnome-continuous and gnome-build-meta repos:

- Abderrahim Kitouni
- Carlos Garcia Campos
- Colin Walters
- Debarshi Ray
- Dor Askayo
- Emmanuele Bassi
- Giovanni Campagna
- Iñigo Martínez
- Jasper St. Pierre
- Javier Jardón
- Jeremy Bicha
- Jordan Petridis

- Michael Catanzaro
- Owen Taylor
- Philip Chimento
- Tristan Van Berkom
- Vadim Rutkovsky
- Valentin David

Special mentions:

- Allan Day (blogs, documentation)
- Andrea Veri (OpenID help)
- James Thomas (openQA tests & QEMU help)
- Will Thompson (Endless installer, OpenQA advice, ...)

CODETHINK PLANS FOR 2023

- Continue Linux mainline testing (OpenQA + LAVA)
- **QAD**: open source tool to control hardware from OpenQA tests
- Hardware **USB switcher** device

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- [@codethink](https://twitter.com/codethink) (Twitter)
- <https://www.codethink.co.uk/>

HOW TO GET INVOLVED

I will provide training on infra maintenance and writing tests - just ask!

- Chat: Matrix [#gnome-os:gnome.org](https://matrix.to/#/#gnome-os:gnome.org) (Liberia.chat #gnome-os)
- Email: sam@afuera.me.uk
- Forum: <https://discourse.gnome.org/>

Also: [documentation](#), [issue tracker](#)

Sam Thursfield
FOSDEM 2023



