Anaconda Installer
Architecture

Presented by
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Today's Topics

1. What is Anaconda?
2. Why (UI) rewrite
3. The NewUI
4. Architecture
   a. Data representation
   b. Hub&Spoke model
5. Threads and communication
6. Initial Setup
7. Addon development

What is Anaconda?

- OS installer for Fedora, RHEL and derivatives doing everything else but installing
- Python package (pyanaconda) + main script, dracut lib and unit files
- supposed to:
  - support both automated (kickstart) and manual installations and also the combination of both
  - support graphical mode and text mode for old sequential-only terminals (s390x)
  - be simple but in the same time complex

Why (UI) rewrite

- decided at FUDCon Tempe 2011
- main reasons:
  - non-modern UI born more than 10 years ago
  - UI-controlling logic mixed with the installation logic
  - basically a single thread stepping the Gtk main loop manually
  - ksdata + installdata + UI elements attributes
  - gtk2 and pygtk based GUI mixing Glade files and widgets created in the code
  - ncurses based text mode with separate code base

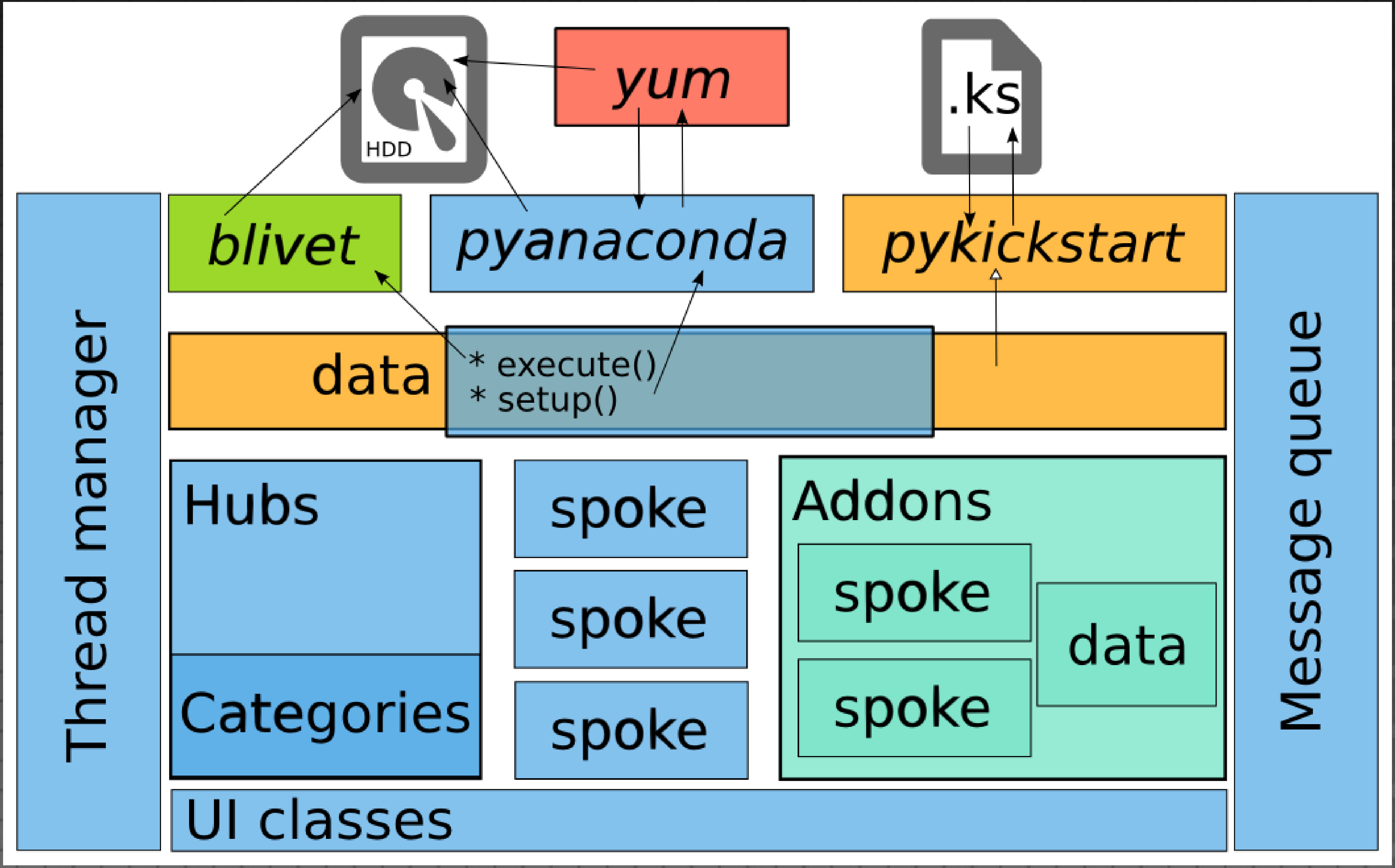
The NewUI

no more scary Anaconda

- modular, extensible, multi-thread
- Hub&Spoke as the basic model
- graphic designed by Máirín Duffy
- kickstart => self.data => kickstart
- customization screens during package installation
- code shared with the new purely textual text mode and Initial Setup
- more transactional
- pyanaconda.storage separated as *blivet*
- 47899 insertions(+), 64380 deletions(-)

fedora™

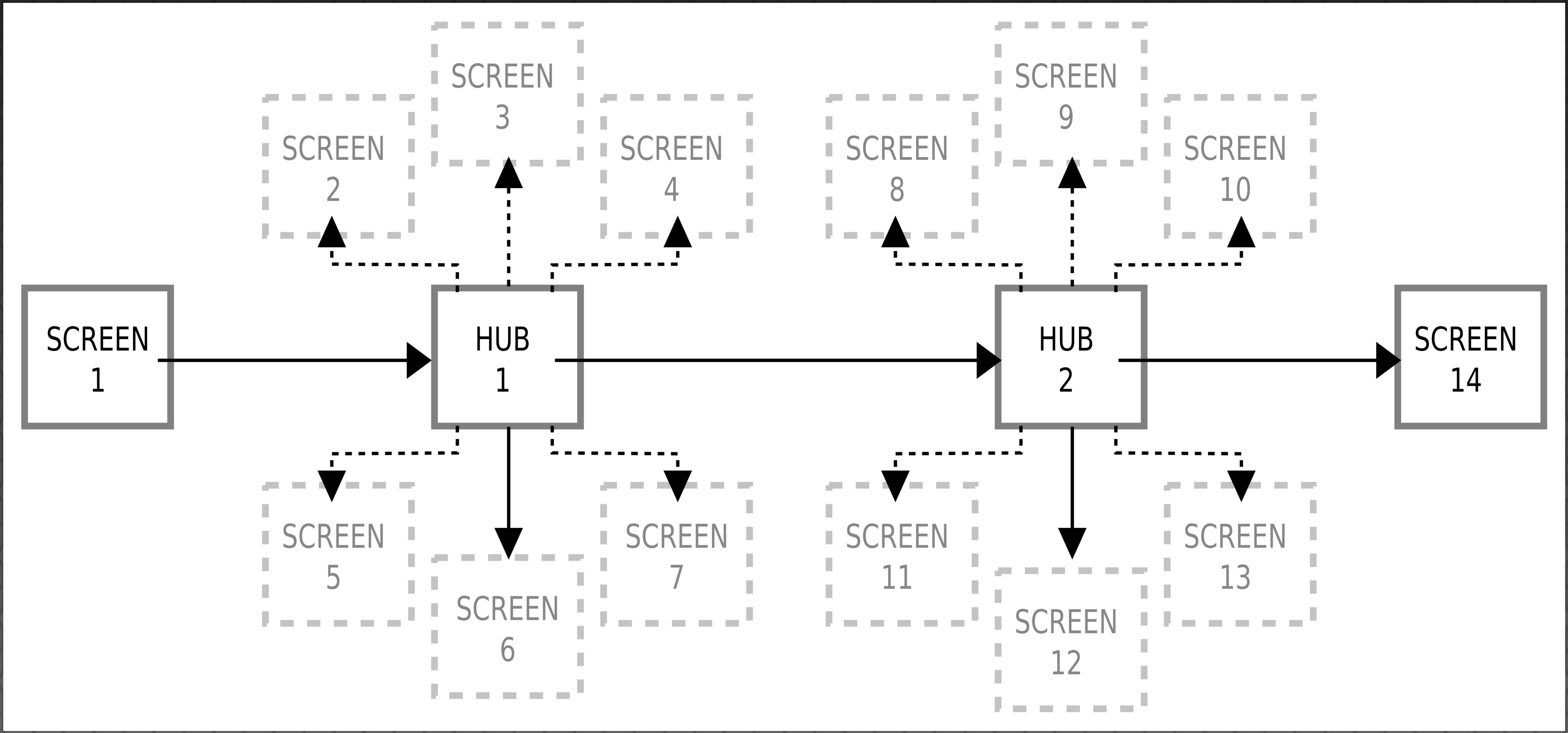
Architecture



Data

- all stored in the pykickstart.KSHandler instance
- life cycle:
  - loaded from the kickstart file (if any)
  - updated with user's choices made in the UI
  - used to drive the installation
  - written out as kickstart file
- tree structure
- read, updated and written out also by the Initial Setup
- *setup* and *execute* methods doing the installation logic

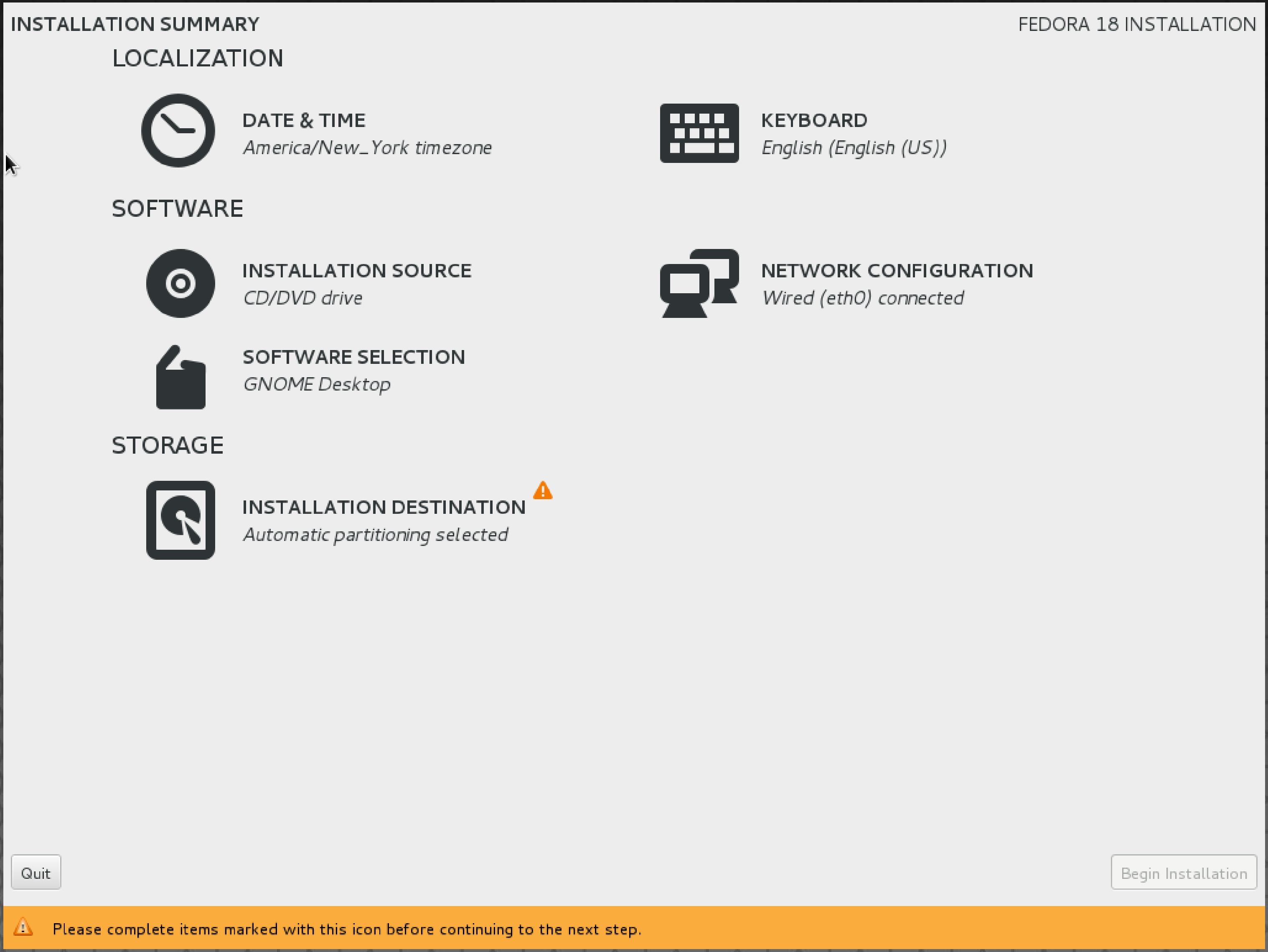
Hub&Spoke model



Hub&Spoke model

- easy and fast access to everything
- no need to visit every spoke
- overview of the settings (updated by background threads)
- layout with great support for extensions
- usable for both graphical and text mode

Hub, Spoke & Anaconda



INSTALLATION SUMMARY

FEDORA 18 INSTALLATION

LOCALIZATION

DATE & TIME
America/New_York timezone

KEYBOARD
English (English (US))

SOFTWARE

INSTALLATION SOURCE
CD/DVD drive

NETWORK CONFIGURATION
Wired (eth0) connected

SOFTWARE SELECTION
GNOME Desktop

STORAGE

INSTALLATION DESTINATION ⚠
Automatic partitioning selected

⚠ Please complete items marked with this icon before continuing to the next step.

Hubs

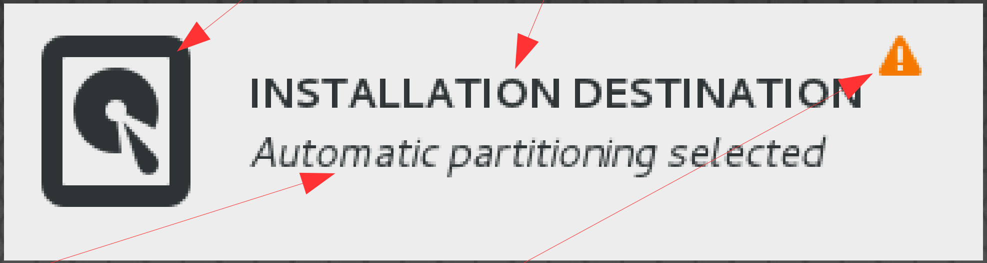
- standalone spokes and hubs are dynamically collected from the predefined places
- categories and spokes are dynamically collected for every hub
- the Summary hub and the Progress hub
- continue possible once all mandatory spokes are completed
- automated installations show summary and progress, but continue automatically (unless user changes anything manually)

Spokes

- StandaloneSpoke and NormalSpoke classes together with custom windows (Gtk widgets)
- marked for use in the Initial Setup or not
- supposed to contain only the UI-controlling logic, installation logic in blivet's, pyanaconda's and self.data's methods and functions
- UI defined in a .glade file (all that is possible)
- the *showable* property determines if the spoke should be shown or not

Normal Spoke

- basic building block of the NewUI
- API defined attributes:
  - *uiFile, mainWidgetName, category, icon, title,*
- API defined methods:
  - *initialize* and *refresh*
  - *apply* and *execute*
- API defined properties:
  - *ready, status*
  - *mandatory* and *completed*



Threads and Gtk

- Gtk main loop running in the main thread
- two Gtk main loops running in separate threads crash X server
- locks allowing controlling Gtk from multiple threads no longer supported (and never recommended)
- GLib.idle_add and related functions are the only supported way
- decorators and functions to facilitate usage
  - *@gtk_thread_wait*, *@gtk_thread_nowait*
  - *gtk_run_once*

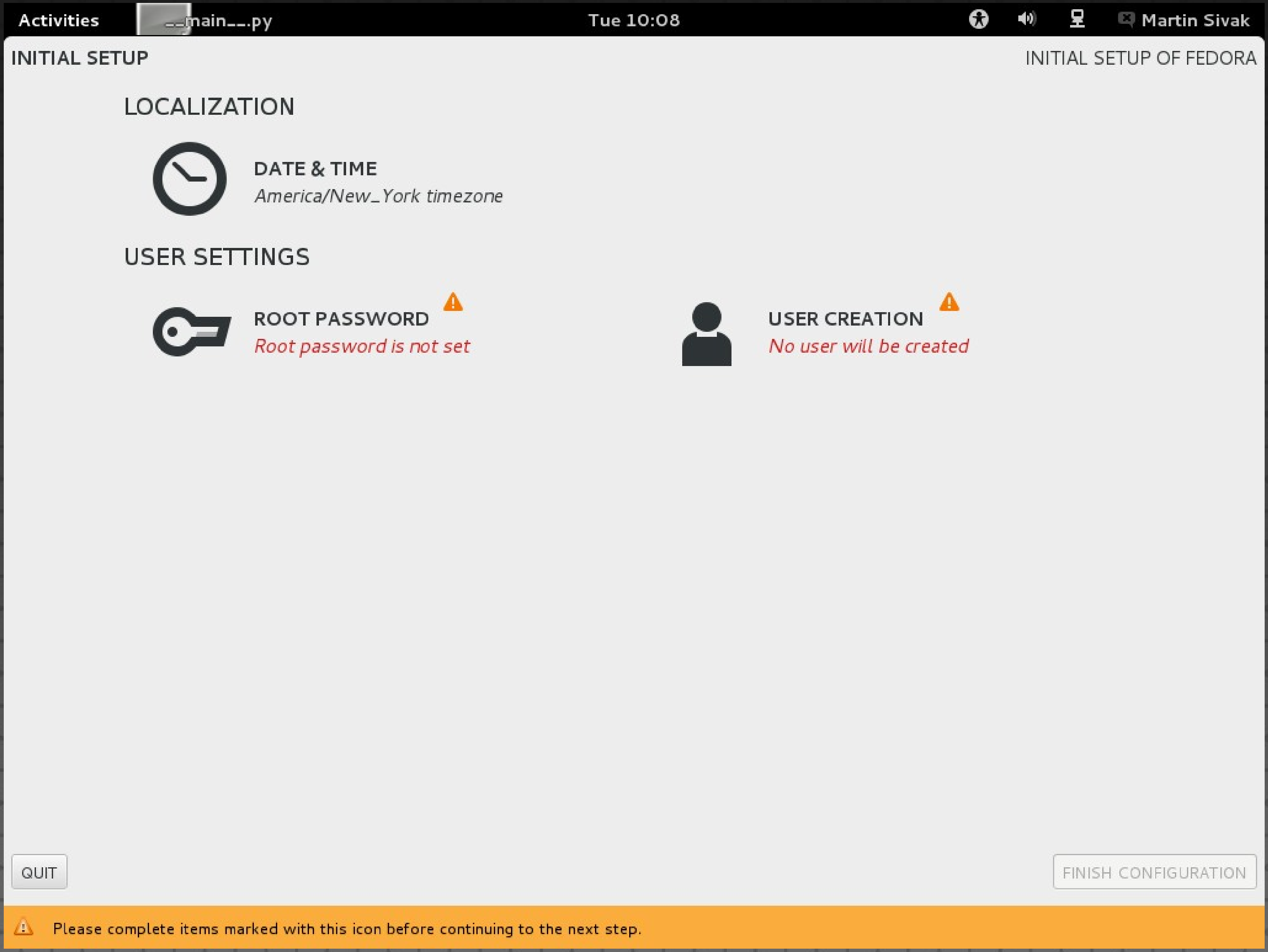
Threads and messages

- threads for all long lasting actions
- ThreadManager singleton and AnacondaThread class facilitating logging and threads usage (also exception handling)
- two message queues
  - hubQ for spoke to hub communication
  - progressQ for reporting and updating installation progress
- experimental implementation also for the text mode (GLib/Gtk main loop, almost always waiting for input)

Initial Setup

- Firstboot replacement, but the old one has to survive because of the legacy 3rd party plugins
- basically only 40 lines of code reusing the code and screens from Anaconda
- reads kickstart file produced by Anaconda and writes a new one at the end
- coordinates screens with Anaconda and Gnome Initial Experience
- targeting F19

Initial Setup


Activities __main__.py Tue 10:08 Martin Sivak

INITIAL SETUP INITIAL SETUP OF FEDORA

LOCALIZATION

DATE & TIME
America/New_York timezone

USER SETTINGS

ROOT PASSWORD
Root password is not set

USER CREATION
No user will be created

QUIT FINISH CONFIGURATION

Please complete items marked with this icon before continuing to the next step.

Addons

- many teams want to have something set in the installation process (or first boot), but we cannot develop and maintain all that stuff
- examples of possible addons:
  - AD/kerberos realm join with realmd
  - SCAP security profile
  - subscription management
  - Emacs :)

Addon development

- kickstart part (must be implemented):
  - class parsing lines from the special %addon section and storing data from them as its attributes
  - lives in the self.data.addons.* subtree
  - methods to modify runtime environment (*setup*) and configure installed system (*execute*)
- UI part (optional):
  - GUI and TUI spokes reading data from self.data and modifying them
  - can be marked also for the Initial Setup
- altogether like 100 lines of code

Addon structure

- a directory under /usr/share/anaconda/addons
- top-level directory named after the addon (e.g. org_fedora_hello_world)
- subdirs for particular parts -- ks, gui, tui
- placed to the installation tree by lorax or with product.img -- still being decided
- classes automatically collected and used if they are subclasses of classes defined by the API

Addon HOWTO

- well-commented Hello world addon [2]
- sources of realworking instances (coming soon)
- Anaconda Addon Development Guide [3]
- questions and answers on the anaconda-devel mailing list
- *anaconda*, *anaconda-widgets* and *anaconda-widgets-devel* packages installed
- *make runspoke* target in the Anaconda's Makefile

Addons FAQ

- Why such a bad name?
  - We don't have any better.
- What happens if the addon for some %addon section is missing?
  - Nothing. The %addon section is ignored and just pasted to the resulting kickstart file.
- Which languages are supported?
  - Python only.

Addons FAQ cont.

- Why this %addon section marking the functionality as being amended? Can't addon that needs only one line just register a new kickstart command?
  - It is possible, but the problem is with the *ksvalidator* tool that needs to distinguish between invalid command and a command of a missing addon.

Summary

- still work in progress
- multi-thread, Gtk3 based, better user experience
- better documentation, better maintainability
- modularity
- a lot of code shared between GUI, TUI and Initial Setup
- extensibility, easy to write addons
- altogether less scary for both users and developers.

Links

- [1] Anaconda/NewInstaller wiki
- [2] Hello world addon
- [3] Anaconda Addon Development Guide
- [4] Anaconda sources

Questions?

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