GNU Radio from Scratch

Martin Braun, Ettus Research

GNU Radio Conference 2015
Outline

1. Introduction
2. Installation
3. Resources
4. Starting to Code
5. Becoming a Developer
6. The Community
Allow me to introduce myself... 

- Long-time GNU Radio enthusiast and contributor
- Community Manager, SoC Coordinator
- WG Leader “Community & User Experience”
- UHD Developer
A clean slate
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(Martin Braun, Ettus Research)
Top 4 easiest ways to install GNU Radio

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3. PyBOMBS
4. Source Builds
PyBOMBS — The apt-get of GNU Radio

- Installs GNU Radio, Hardware Drivers and OOTs for you!
- Sets up environment variables etc. for you!
- Currently available at: http://gnuradio.org/pybombs
- Modules are added by PyBOMBS maintainers in form of lightweight recipes
- Rewrite happening, PyBOMBS 2.0 to be released this year
PyBOMBS 2.0

- Still Alpha
- Features:
  - Installable
  - Multiple prefixes, each with its own configuration
  - Multiple recipe remotes, per system, per user or per prefix
  - Easy cross-compiling
- Action happening at:
  
github.com/gnuradio/pybombs2
Source Builds

Useful for development on GNU Radio itself

Requirements:

1. Install all dependencies (Boost, UHD, QT, ...)
2. Run `cmake && make && make install`
3. Et Voilà! You’re done! (or not)
CGRAN

- Spiritual Cousin of CTAN, CPAN…
- Recently rewritten by the CGRAN Special Forces (main contributors: Nathan + Ravi)
- Easy access to the entire free & open software radio ecosystem
- Automatically generated website listing most OOT modules
- Between CGRAN and PyBOMBS, finding and installing modules should be a simple task
First Steps: Guided Tutorials

- Gentle introduction to GNU Radio (and even some DSP)
- Find these online on our wiki
- Comes with a free set of codes: `gr-tutorial`
Where do I learn about these blocks?

- Read our fine manual!
  - [http://gnuradio.org/doc/](http://gnuradio.org/doc/)
- All blocks are browsable through several paths, and searchable
- GRC provides docs, too
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gr_modtool — The Swiss Army Knife of modules

- Modify and create your OOTs from the command line
  - Unfortunately, only the command line at this time
- Create, remove, disable, enable blocks
- Never write any boilerplate code again!
Starting to Code

Writing blocks: A core skill of developing SDR

- `gr_modtool` tries to make this as easy as possible
- Languages available:
  - Python, for fast & easy dev
  - C++, for highest performance

(Martin Braun, Ettus Research) GNU Radio from Scratch
Where do I learn how to use all these blocks?

- How do I learn how to do all this wireless communications stuff?
- Which codez do I put into my <+ do signal processing here +>?
Where do I learn how to use all these blocks?

- How do I learn how to do all this wireless communications stuff?
- Which codez do I put into my `<+ do signal processing here +>`?
- Well...
Where do I learn how to use all these blocks?

- How do I learn how to do all this wireless communications stuff?
- Which code do I put into my `<+ do signal processing here +>`?
- Well...
- Ask Jeff
Getting Help — Interacting with other People

- discuss-gnuradio, usrp-users mailing lists
- Very responsive!
- IRC: #gnuradio on Freenode
- Join the discussions!
- But first, read the wiki page on reporting errors, etc.!
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Improving GNU Radio

You’ve found a bug? Something’s bothering you?

- Fix it!
- Actual bugs
- Missing features
- Bad docs
- Unintuitive coding
The Community

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(Martin Braun, Ettus Research)
Am I supposed to do this all alone?
(Also, I’m running out of shirts)
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No!
See gnuradio.spreadshirt.{com, de}
Am I supposed to do this all alone?
(Also, I’m running out of shirts)
No!
See gnuradio.spreadshirt.{com, de}
There’s a big community, join it!
There’s the conference, and also local meetings, hackfests...
The Community

Conclusion

- SDR is a very hard topic
- But GNU Radio is there to make it easier
- Getting started with GNU Radio, writing first blocks etc. is well documented at this point
  - (and if it’s not, maybe you can help us improve it!)
- And after that, we have a great community

(Martin Braun, Ettus Research)