High Performance Software Defined Radio

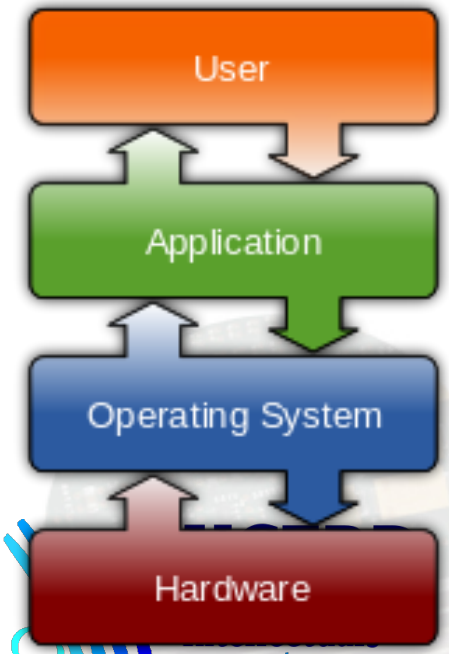
Tassadaq Hussain

Riphah International University
Microsoft Barcelona Supercomputing Center
Universitat Politécnica de Catalunya
Barcelona, Spain
UCERD Pvt Ltd

UCERD
Gathering Intellectuals
www.ucerd.com

Operating System

An Operating System (OS) manages all of the software and hardware on the computer. Most of the time, there are several different computer programs running at the same time, and they all need to access your computer's central processing unit (CPU), memory, and storage.



Operating System

Manages Resources

- Task Management
- Memory Management
- I/O Management
- Power Management
- Network Management

SDR OS

http://ucerd.com/software_defined_radio_workshop.php

Pentoo

Skywave

Outcome: Software and OS

Flexibility

Programmability

Portability

Scalability

Performance

Cost

Software defined radio?

Get the software **close to the antenna**

Software **defines** the waveforms

Replace analog signal processing **with** signal processing and program the application in softwares.

Disadvantages

Higher power consumption than dedicated ASIC approach

More MIPS required

Higher cost (today)

Current and Future SDR users

Military

Cellular base stations

Personal communication devices Cellular / Paging / Wireless LAN(s) PC based “generic transceiver” Radio / TV Emerging unlicensed RF band apps

What is “free software?”

“Free as in liberty”

User has **access to the source**

User is **free to modify** and is encouraged to contribute the modifications back to the community

A **culture** of **innovation**

Various licenses: GNU General Public License (GPL), Mozilla, Artistic License.

Programming

Programing	Scripting	Dataflow
Deals direly with ISA of processor	Uses Interpreter	Graphical Interface
C/C++	Python	GNU Radio Labview

What is GNU Radio?

It's a free software defined radio

A **platform for experimenting** with digital communications

A **platform for signal processing** on commodity hardware

The primary resource for authoritative information on GNU Radio is the GNURadio wiki page:

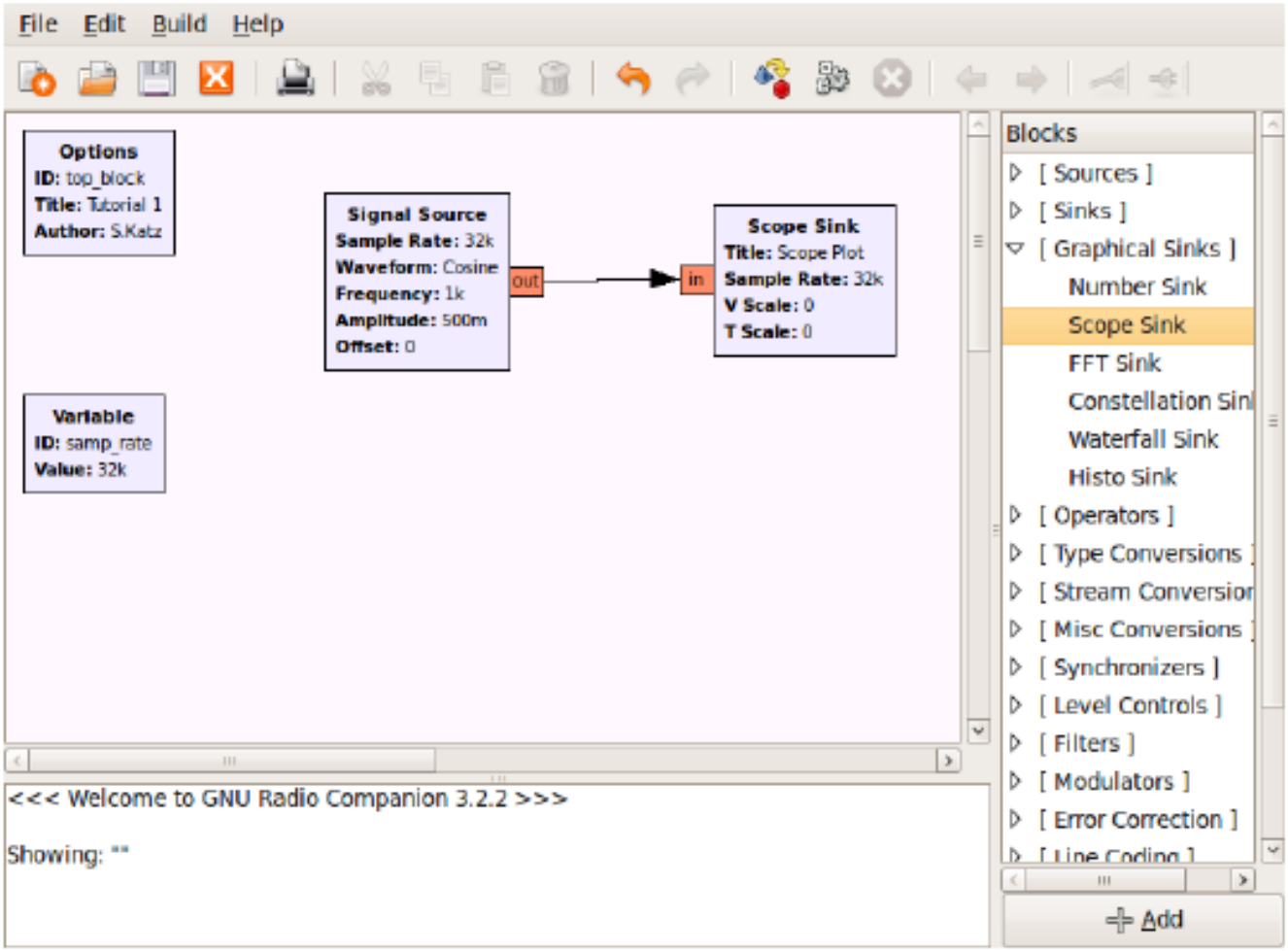
http://gnuradio.org/redmine/projects/gnuradio/wiki

The tabs across the top of the page will assist you in navigation of this complex website for additional in-depth information on specific areas of interest.

The blog posts by Tom Rondeau (KB3UKZ), one of the principal developers for GRC, are very informative on specific technical topics as well as GNU organizational details:

http://www.trondeau.com/

Explore his blog site for additional information regarding GRC.


File Edit Build Help
Options
ID: top_block
Title: Tutorial 1
Author: S.Katz
Signal Source
Sample Rate: 32k
Waveform: Cosine
Frequency: 1k
Amplitude: 500m
Offset: 0
out
in
Scope Sink
Title: Scope Plot
Sample Rate: 32k
V Scale: 0
T Scale: 0
Variable
ID: samp_rate
Value: 32k
Blocks
[Sources]
[Sinks]
[Graphical Sinks]
Number Sink
Scope Sink
FFT Sink
Constellation Sin
Waterfall Sink
Histo Sink
[Operators]
[Type Conversions]
[Stream Conversior
[Misc Conversions]
[Synchronizers]
[Level Controls]
[Filters]
[Modulators]
[Error Correction]
[Line Coding]
Add
<<< Welcome to GNU Radio Companion 3.2.2 >>>
Showing: ""

Modules/Blocks

Written in C++ or Python