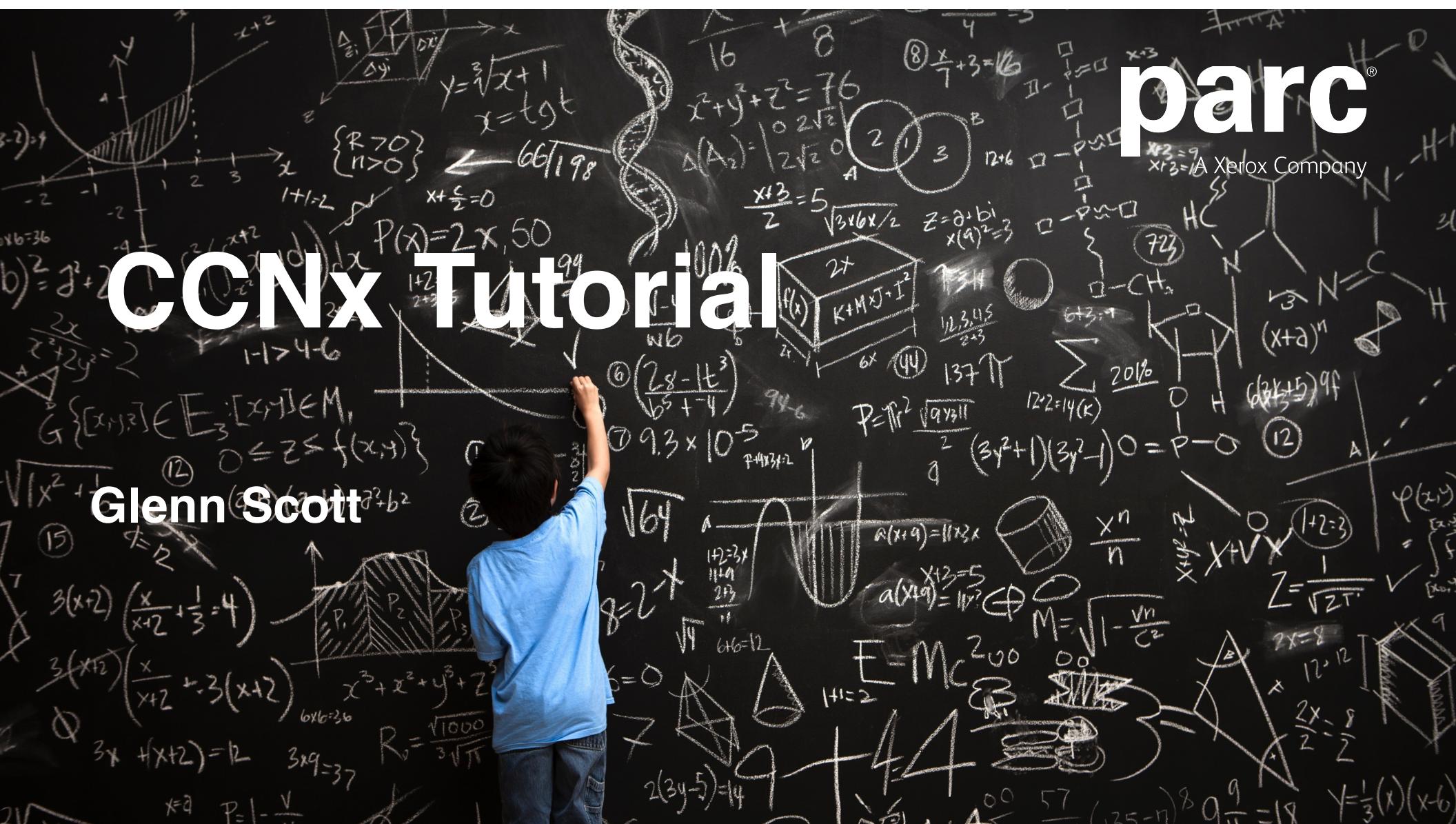


**parc**<sup>®</sup>

A Xerox Company

# CCNx Tutorial

Glenn Scott



# CCNx Tutorial

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# CCNx Tutorial

## Get Connected

Find a power-strip

Connect to PARC Wifi

SSID: **parcvisitor**

Password: **parcvisitor**

Go to <https://ccnx.org>



CCNx PROJECT SOFTWARE DOCUMENTATION CCNXCON

## Project CCNx®

The vision of Project CCNx® is to develop, promote, and evaluate a new approach to communication architecture we call content-centric networking. We seek to carry out this mission by creating and publishing open protocol specifications and a software reference implementation of those protocols. We provide support for a community of people interested in experimentation, research, and commercialization of this technology.

**CCNxCon 2015 – Registration open!**

Register Now! After three successful CCNx Community Meetings in 2011, 2012, and 2013, we are pleased to announce the fourth CCNx Community Meeting.

**WHAT'S NEW**

CCNx Community Meeting 2015 -- Register Now!

**JOIN THE CONVERSATION**

Mailing Lists  
[ccnx - General Development Discussion](#).  
[ccnx-announce - Announcements Only](#).

[CCNx Issue Tracker](#)

**UPCOMING & RECENT EVENTS**

10/21/14 [CCNx Workshop](#) (Palo Alto, CA)  
1/13/15 ICNRG interim meeting (Cambridge, MA)  
3/22/15 [IETF 92](#) (Dallas, TX)  
5/18/15 [CCNxCon 2015](#) (Palo Alto, CA)  
7/19/15 [IETF 93](#) (Prague, Czech Republic)  
9/20/15 [ICN 2015](#) (San Francisco, CA)

**CCNx**  
Internet-Draft Intended status: Experimental Expires: July 13, 2015 R. Morris PARC, Inc. January 9, 2015 CCNx Semantics draft-morris-icn-semantics-00

# CCNx Tutorial

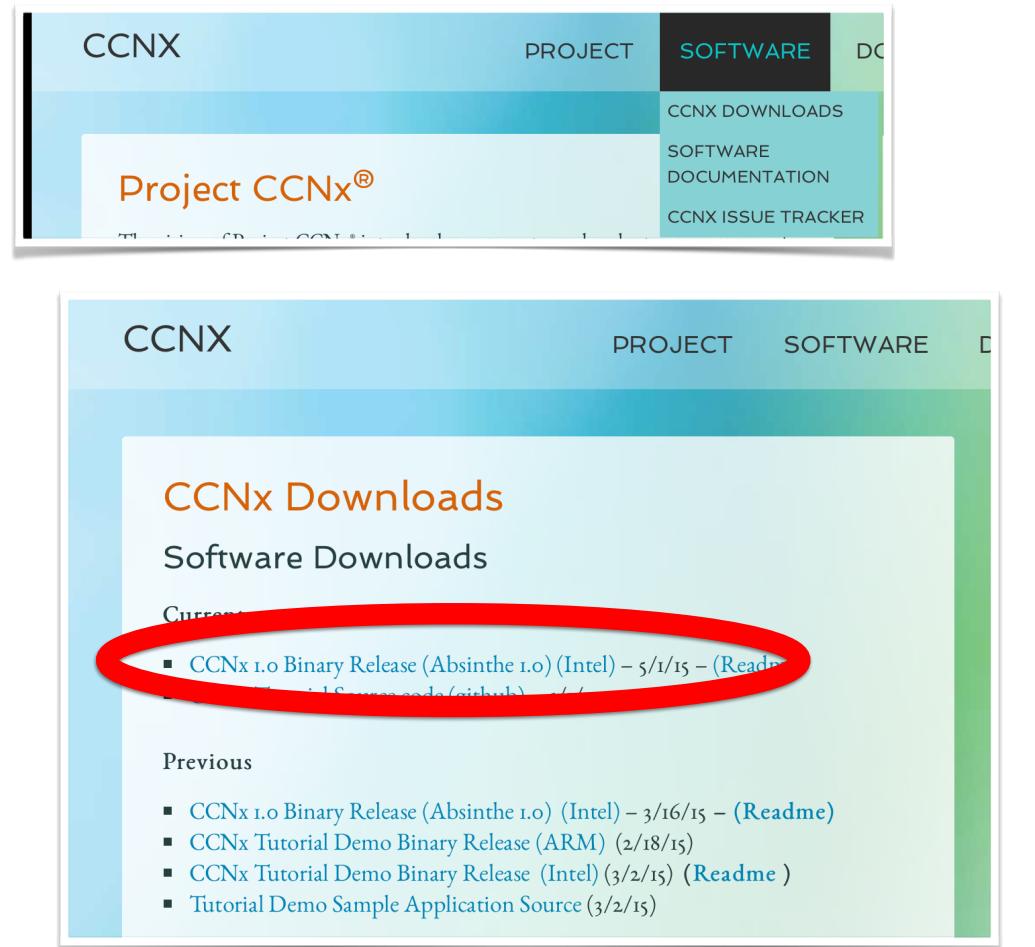
## **Setup Operating Environment**

Ubuntu 14.04

# CCNx Tutorial

## Download

Download from the  
ccnx.org website



The image displays two screenshots of the CCNx website. The top screenshot shows the main navigation bar with 'PROJECT' and 'SOFTWARE' tabs selected. The bottom screenshot shows the 'CCNx Downloads' page under the 'Software Downloads' section. A red oval highlights the first item in the 'Current' releases list, which is 'CCNx 1.0 Binary Release (Absinthe 1.0) (Intel) – 5/1/15 – (Readme)'.

CCNx

PROJECT SOFTWARE

CCNx DOWNLOADS

SOFTWARE DOCUMENTATION

CCNx ISSUE TRACKER

Project CCNx®

CCNx

PROJECT SOFTWARE

CCNx Downloads

Software Downloads

Current

- CCNx 1.0 Binary Release (Absinthe 1.0) (Intel) – 5/1/15 – (Readme)

Previous

- CCNx 1.0 Binary Release (Absinthe 1.0) (Intel) – 3/16/15 – (Readme)
- CCNx Tutorial Demo Binary Release (ARM) (2/18/15)
- CCNx Tutorial Demo Binary Release (Intel) (3/2/15) (Readme)
- Tutorial Demo Sample Application Source (3/2/15)

# CCNx Tutorial

## Untar Binary

Installs directly into /usr/local/parc and /usr/local/ccn

```
[ccn@ccntutorial:/tmp]$ ls -l
total 4444
-rw-rw-r-- 1 ccn ccn 4549285 May  1 16:08 distillery-ccnx-absinthe-1.0-20150501-Linux-x86_64.tgz
[ccn@ccntutorial:/tmp]$ tar tzvf distillery-ccnx-absinthe-1.0-20150501-Linux-x86_64.tgz|head
drwxr-xr-x isolis/root      0 2015-05-01 13:39 usr/local/parc/
drwxrwxr-x isolis/isolis   0 2015-05-01 13:38 usr/local/parc/include/
drwxrwxr-x isolis/isolis   0 2015-05-01 13:37 usr/local/parc/include/LongBow/
-rw-r--r-- isolis/isolis  4559 2015-05-01 13:37 usr/local/parc/include/LongBow/longBow_Config.h
-rw-r--r-- isolis/isolis  3740 2015-05-01 13:37 usr/local/parc/include/LongBow/longBow_SubProcess.h
-rw-r--r-- isolis/isolis  1807 2015-05-01 13:37 usr/local/parc/include/LongBow/longBow_TestFixtureConfig.h
-rw-r--r-- isolis/isolis  4732 2015-05-01 13:37 usr/local/parc/include/LongBow/longBow_Event.h
-rw-r--r-- isolis/isolis  2617 2015-05-01 13:37 usr/local/parc/include/LongBow/longBow_Location.h
-rw-r--r-- isolis/isolis  5091 2015-05-01 13:37 usr/local/parc/include/LongBow/longBow_RuntimeResult.h
-rw-r--r-- isolis/isolis  8618 2015-05-01 13:37 usr/local/parc/include/LongBow/longBow_Compiler.h
[ccn@ccntutorial:/tmp]$ sudo tar -C / -xzvf distillery-ccnx-absinthe-1.0-20150501-Linux-x86_64.tgz
```

# CCNx Tutorial

## Clone, Configure, and Compile CCN-Tutorial-Demo

```
[ccn@ccntutorial:/tmp]$ git clone https://github.com/PARC/ccnx-tutorial.git
Cloning into 'ccnx-tutorial'...
remote: Counting objects: 54, done.
remote: Total 54 (delta 0), reused 0 (delta 0), pack-reused 54
Unpacking objects: 100% (54/54), done.
Checking connectivity... done.
[ccn@ccntutorial:/tmp]$ cd ccnx-tutorial
[ccn@ccntutorial:/tmp/ccnx-tutorial]$ ./configure ; make
```

# CCNx Tutorial

- Directory Structure

# CCNx Tutorial

`/usr/local/parc`

LongBow - Support for writing C programs

Runtime validity checking, unit testing, code analysis

PARC Library - PARC's C runtime

Memory management

Object representation

Basic data structures

Portability assistance

# CCNx Tutorial

`/usr/local/ccnx`

LongBow - Support for writing C programs

Runtime validity checking, unit testing, code analysis

PARC Library - PARC's C runtime

Memory management

Object representation

Basic data structures

Portability aids

# CCNx Tutorial

## LongBow Validity Checking

assertTrue( )

```
#include <LongBow/runtime.h>

void
main(int argc, char *argv[argc])
{
    assertTrue(argc == 0,
               "Command line parameters disallowed.");
}
```

assertFalse( )

assertNull( )

assertNotNull( )

# CCNx Tutorial

## LongBow Unit Testing

Native C

```
#include <LongBow/unit-test.h>

LONGBOW_TEST_CASE(Global, someTest)
{
    char expected = 'a';
    char c = expected;

    assertTrue(c == expected,
               "Expected '%c', actual '%c'", expected,
               actual);
}
```

# CCNx Tutorial

## LongBow Code Analysis

Cyclomatic complexity

longbow-complexity-report

Code coverage

longbow-coverage-report

Documentation

longbow-doxygen-report

Naming

longbow-name-report

Size

longbow-size-report

Style

longbow-style-report

Vocabulary

longbow-vocabulary-report

```
% longbow-coverage-report parc_JSON*.c
File Path          Score
parc_JSON.c        100.00
parc_JSONArray.c   100.00
parc_JSONPair.c    100.00
parc_JSONParser.c  95.95
parc_JSONValue.c   98.87
%
```

# CCNx Tutorial

## **PARC Library (`libparc.a`)**

“Unified” C runtime

Patterned after the JRE

Memory and buffer management

Basic data structures

Input/Output management

Developer and debugging assistance

Security related functions and facilities

Threading, Concurrency, and lock-free

# CCNx Tutorial

## **CCNx Library (`libccnx.a`)**

Bridging CCN (the specification) and CCNx  
(the implementation)

Interests, Content Objects, Names, Security

# CCNx Tutorial

## CCNx Transport (`librta.a`)

Connecting APIs to the network

“Ready to Assemble” stack toolkit

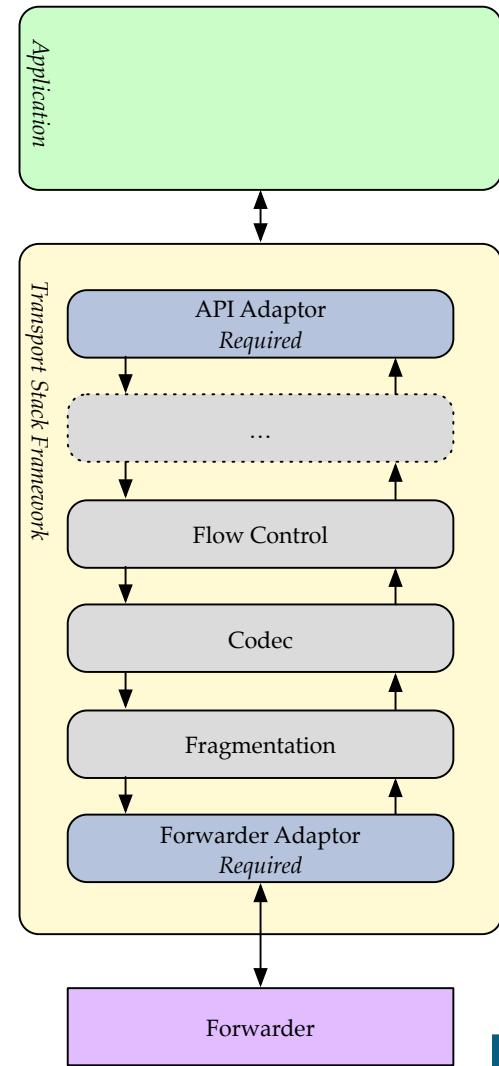
Contains a basic set of stack components

Portal API Adaptor

Simple flow controller supporting the chunk protocol

Implements the current packet format

Loopback and Metis Forwarder Adaptors.



# CCNx Tutorial

## CCNx Portal (`libccnx_api_portal.a`)

Connecting applications to the network

Message and chunked protocols

