# Documentation Improvements

Chapel Team, Cray Inc.

Chapel version 1.13

April 7, 2016

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# Outline

- chpldoc Improvements
- Online Documentation Improvements
- Key Web Updates
- Chapel Users Guide
- Other Documentation Improvements

# chpldoc Improvements

# chpldoc: Traversing ‘use’ Statements

## Background:

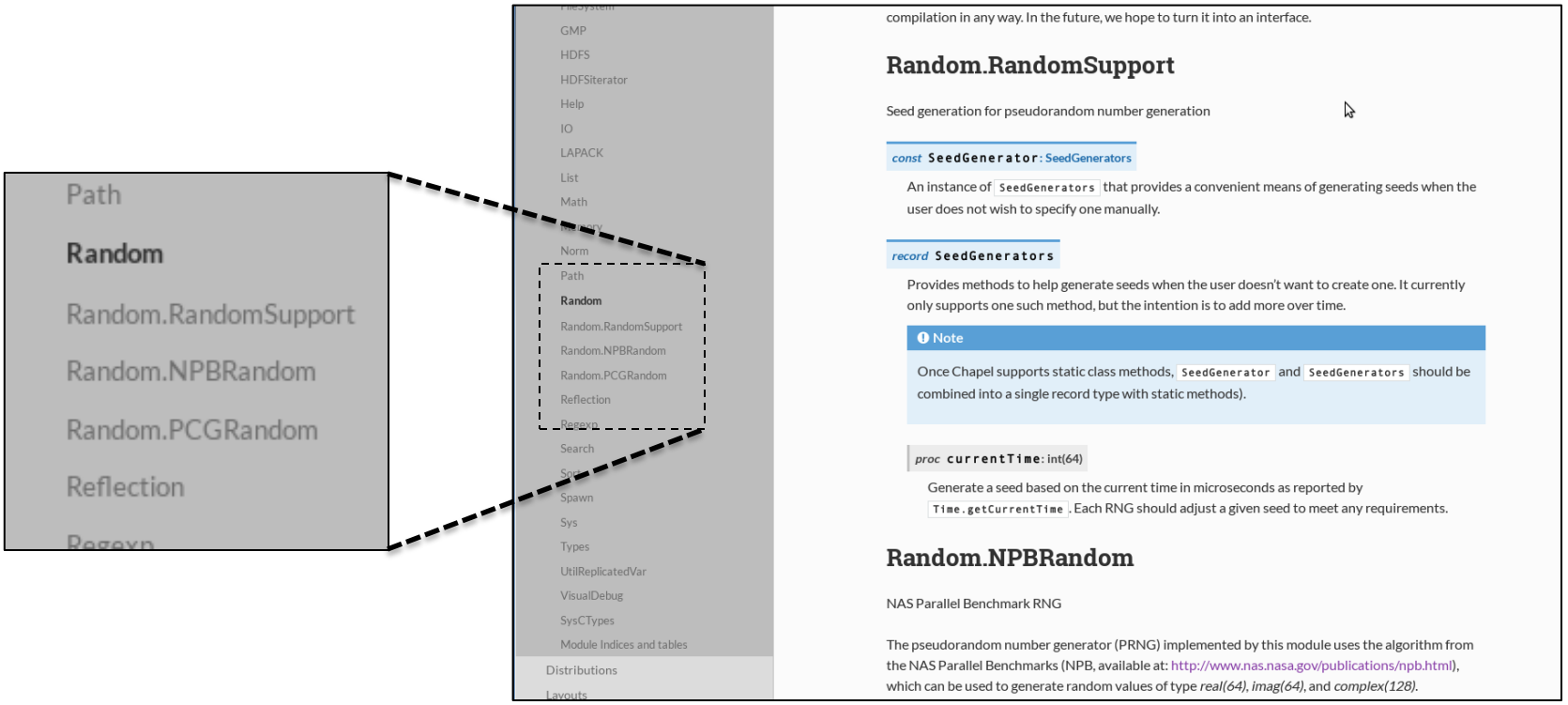
- Previously, chpldoc generated documentation for all ‘use’d modules
  - Arguably unintuitive as an end-user interface
  - Required all dependent modules to be available to generate docs
  - Led to errors when generating docs without a full Chapel installation

## This Effort:

- changed chpldoc to only document files listed on its command line
  - Improves documentation time for a single file slightly
    - (chpldoc is quite fast in either case)
  - New flag reverts to previous behavior: --process-used-modules

# chpldoc: Handling Submodules

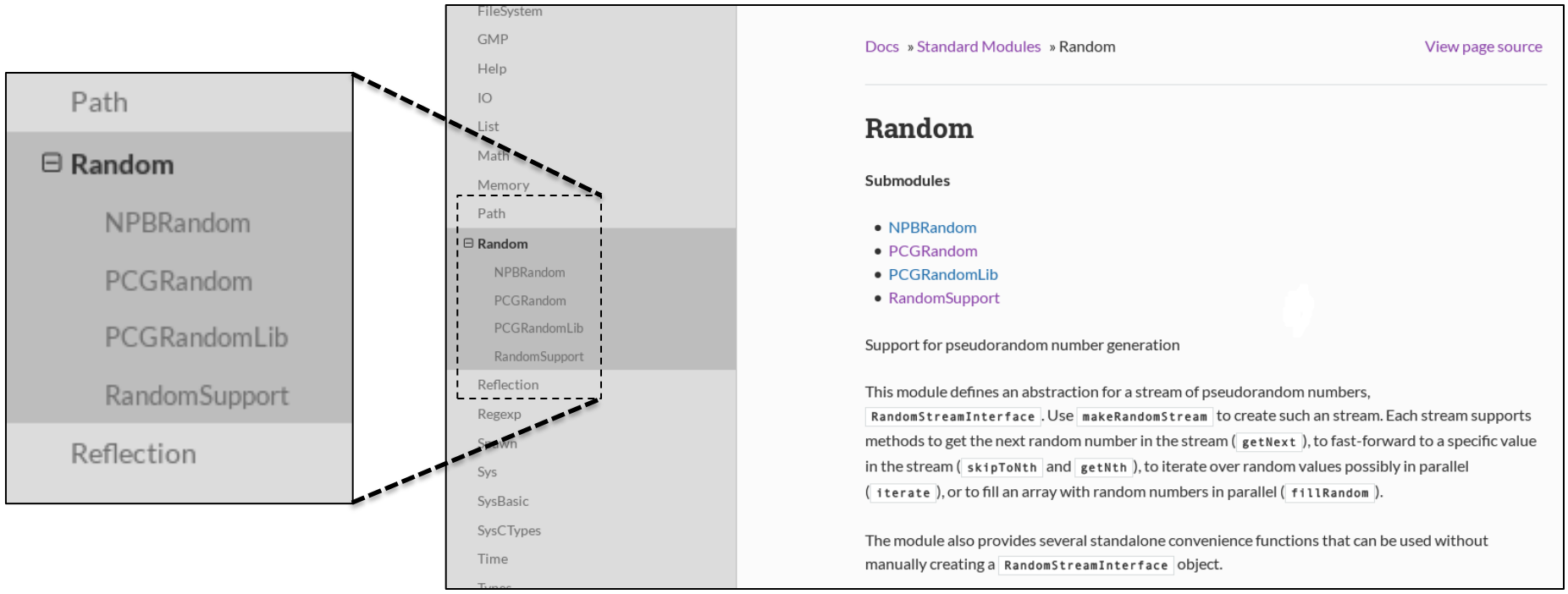
- **Background:** chpldoc generated 1 page per source file
  - So, sub-modules appeared on the same page as their parent module
    - Made documentation dense and difficult to read
    - rst-related bug mis-associated symbols following a sub-module with it



# chpldoc: Handling Submodules

## This Effort:

- Switched to creating 1 page per module
- Sidebar menu now reflects sub-module hierarchy
- Parent modules link to sub-modules at the top of their page
- Avoids incorrect sub-module association bug



# chpldoc: Building Online Docs

## Background: chpldoc built html by default

- Building online docs required repetitive steps
- Difficult to integrate non-chpldoc documentation with chpldoc output
  - e.g., HTML files created from .rst documentation files in the release

## This Effort: New chpldoc flag: --[no-]html

- Only builds intermediate (reStructureText) files
- Enables integrating chpldoc and non-chpldoc documentation

## Impact:

- Online documentation builds ~2x faster
- Users can integrate their chpldoc docs with external files

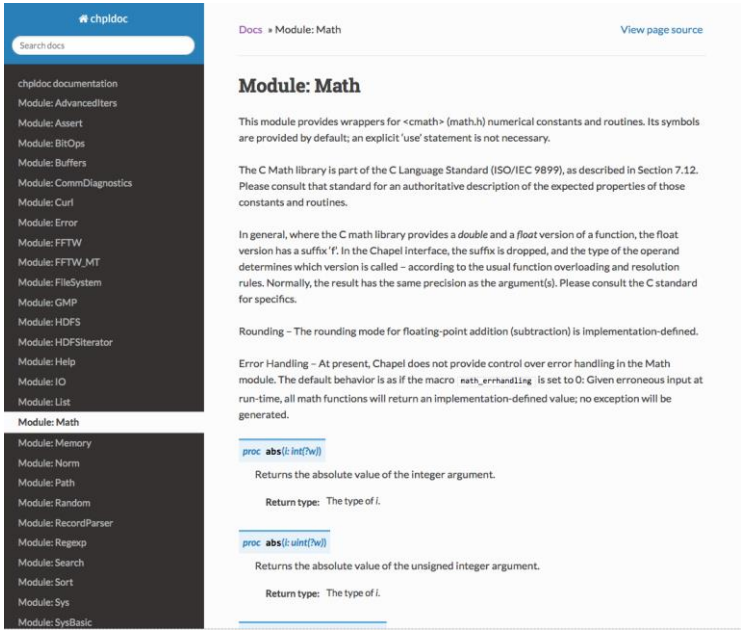
# chpldoc: Next Steps

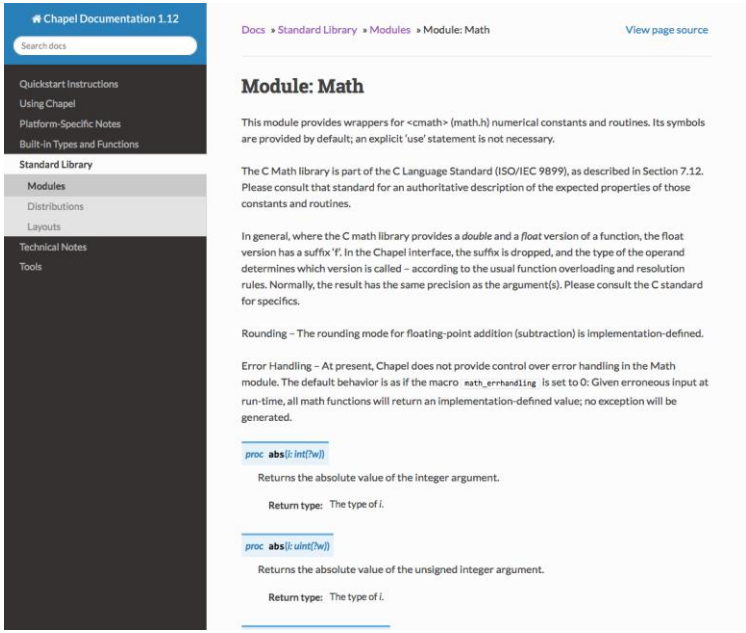
- **Output 'usage' information for each module**
  - (didn't make it into 1.13, but on master now)
- **Change testing of chpldoc to validate .rst output**
  - currently uses distinct text-oriented mode which could then be retired
- **Add class/record view, including inheritance**
  - Plus, class and record index
- **Support testing Chapel code used in chpldoc comments**
  - Similar to Python doctests
- **Link module documentation to source code**
- **Misc bug fixes**
  - Fix accidental output of code within nested block statements
  - Clean up HTML appearance of type and param methods

# Online Documentation Improvements

# Online Documentation: Background

- **v1.12 documentation improved significantly over v1.11**



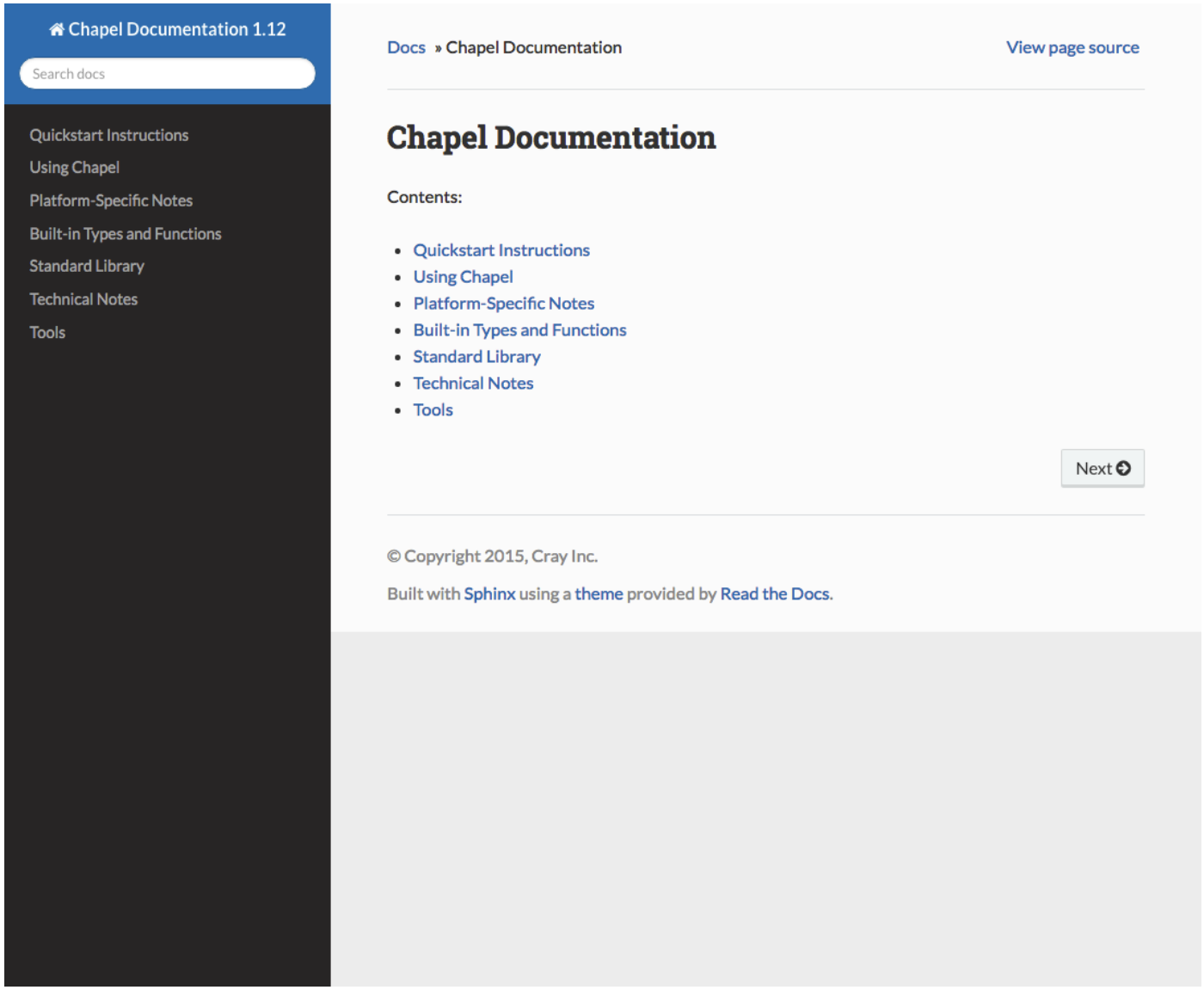




- **But there was still plenty of room for improvement:**
  - Some pages included undocumented items
  - Organization seemed poor at times
  - Some docs remained on chapel.cray.com rather than in docs/

# Online Documentation: This Effort

- **New content:**
  - 'chpl' & 'chpldoc' man pages
  - Moved documents from website to chapel.cray.com/docs hierarchy:
    - Quick Reference, Language Specification, and Language Evolution
  - Improved documentation coverage
  - Started a Chapel Users Guide
- **Improved organization**
  - Standard modules broken into more logical containers
    - Standard and Package modules
    - Standard Layouts and Distributions
  - Numerous other minor changes
- **Improved look-and-feel**
  - Upgraded Sphinx & Read the Docs versions
  - Added broken link detection for documentation via 'make check'
    - Using this, fixed all broken links (over 100)

# Index: 1.12



Chapel Documentation 1.12

Search docs

Quickstart Instructions
Using Chapel
Platform-Specific Notes
Built-in Types and Functions
Standard Library
Technical Notes
Tools

Docs » Chapel Documentation View page source

## Chapel Documentation

Contents:

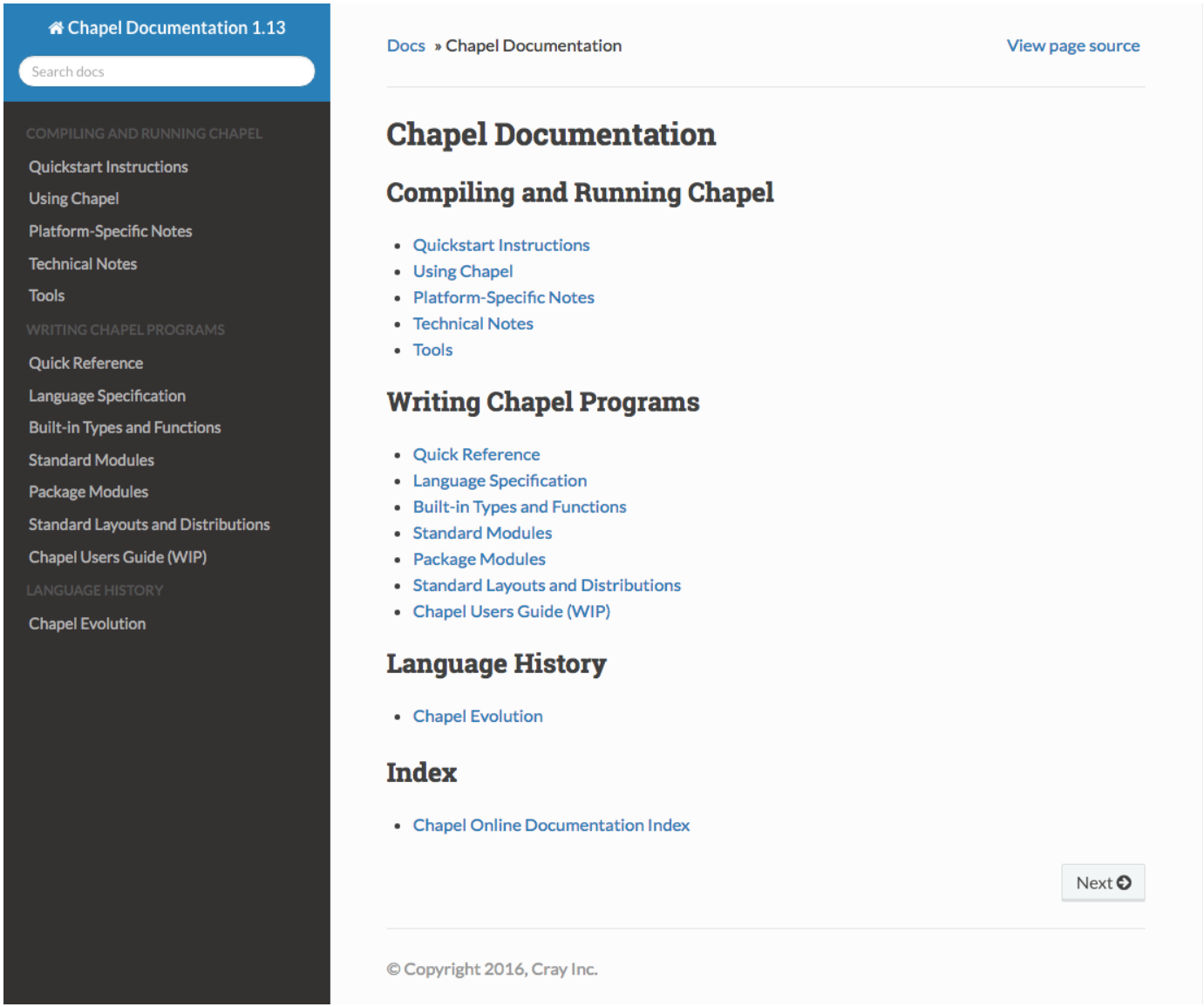
- Quickstart Instructions
- Using Chapel
- Platform-Specific Notes
- Built-in Types and Functions
- Standard Library
- Technical Notes
- Tools

Next



Built with Sphinx using a theme provided by Read the Docs.

# Index: 1.13



Chapel Documentation 1.13

Search docs

COMPILING AND RUNNING CHAPEL

Quickstart Instructions
Using Chapel
Platform-Specific Notes
Technical Notes
Tools

WRITING CHAPEL PROGRAMS

Quick Reference
Language Specification
Built-in Types and Functions
Standard Modules
Package Modules
Standard Layouts and Distributions
Chapel Users Guide (WIP)

LANGUAGE HISTORY

Chapel Evolution

Docs » Chapel Documentation View page source

## Chapel Documentation

### Compiling and Running Chapel

- Quickstart Instructions
- Using Chapel
- Platform-Specific Notes
- Technical Notes
- Tools

### Writing Chapel Programs

- Quick Reference
- Language Specification
- Built-in Types and Functions
- Standard Modules
- Package Modules
- Standard Layouts and Distributions
- Chapel Users Guide (WIP)

### Language History

- Chapel Evolution

### Index

- Chapel Online Documentation Index

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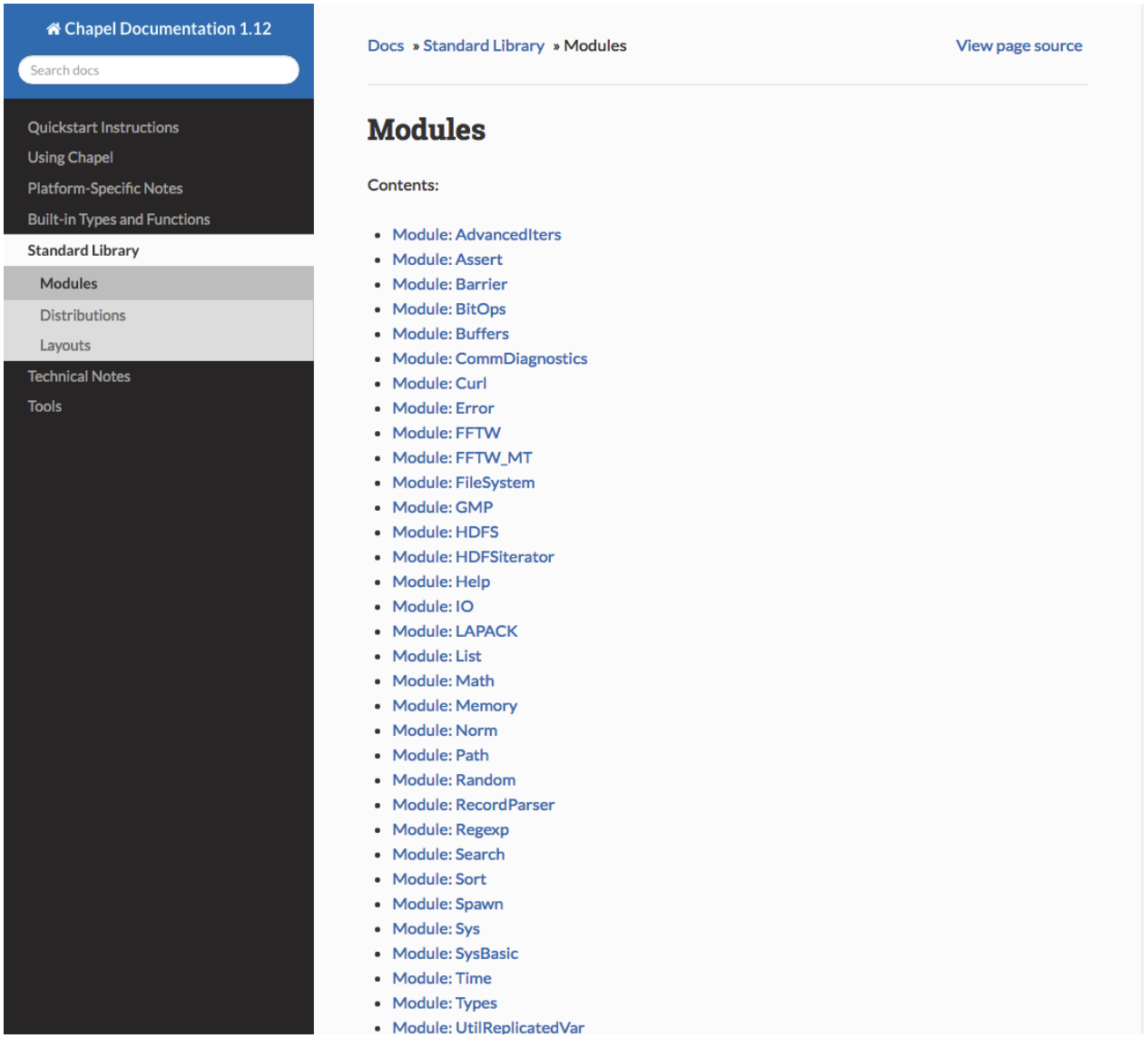
# Standard Modules: 1.12



Chapel Documentation 1.12

Search docs

- Quickstart Instructions
- Using Chapel
- Platform-Specific Notes
- Built-in Types and Functions
- Standard Library
  - Modules
  - Distributions
  - Layouts
- Technical Notes
- Tools

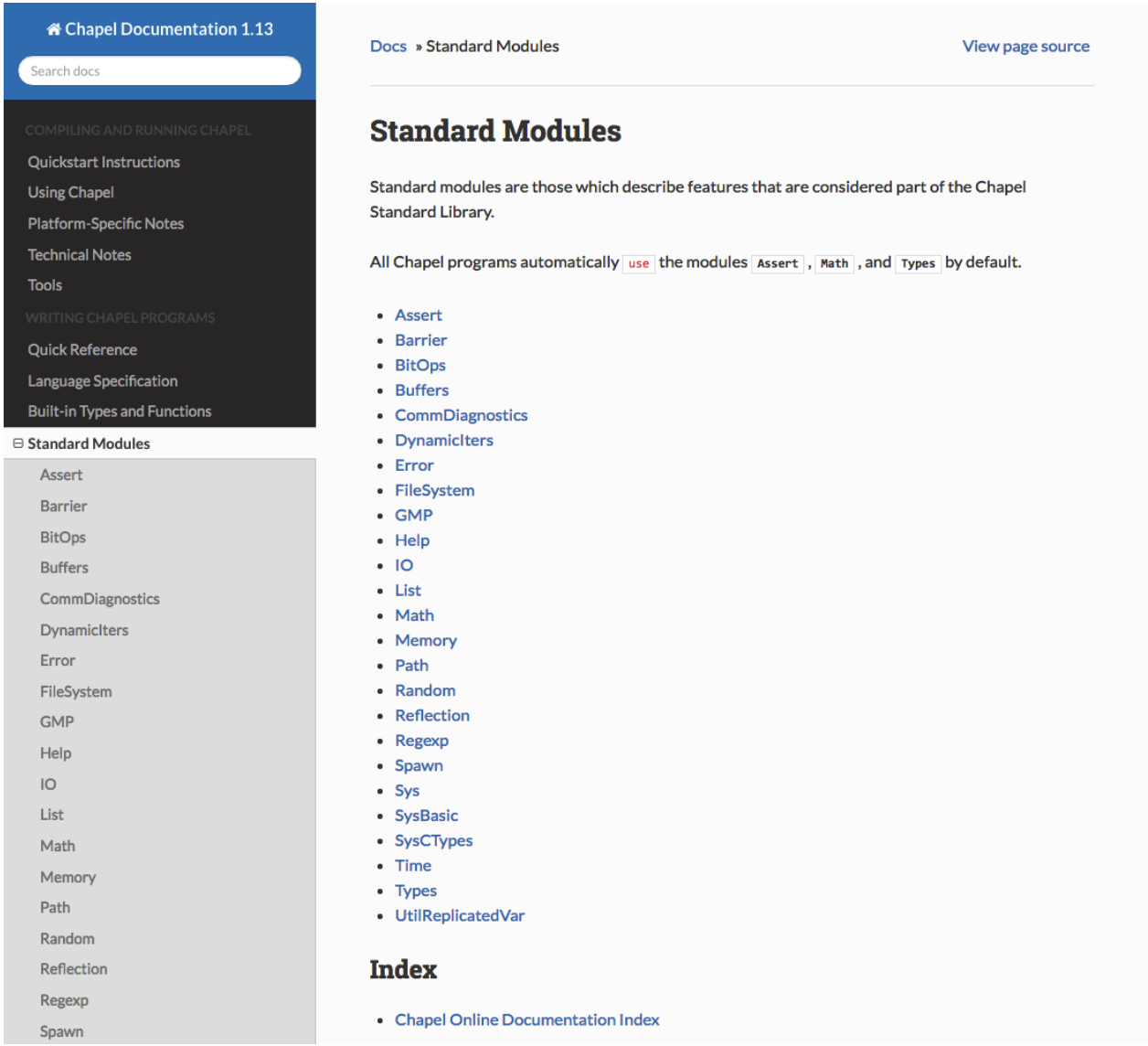
Docs » Standard Library » Modules — View page source

## Modules

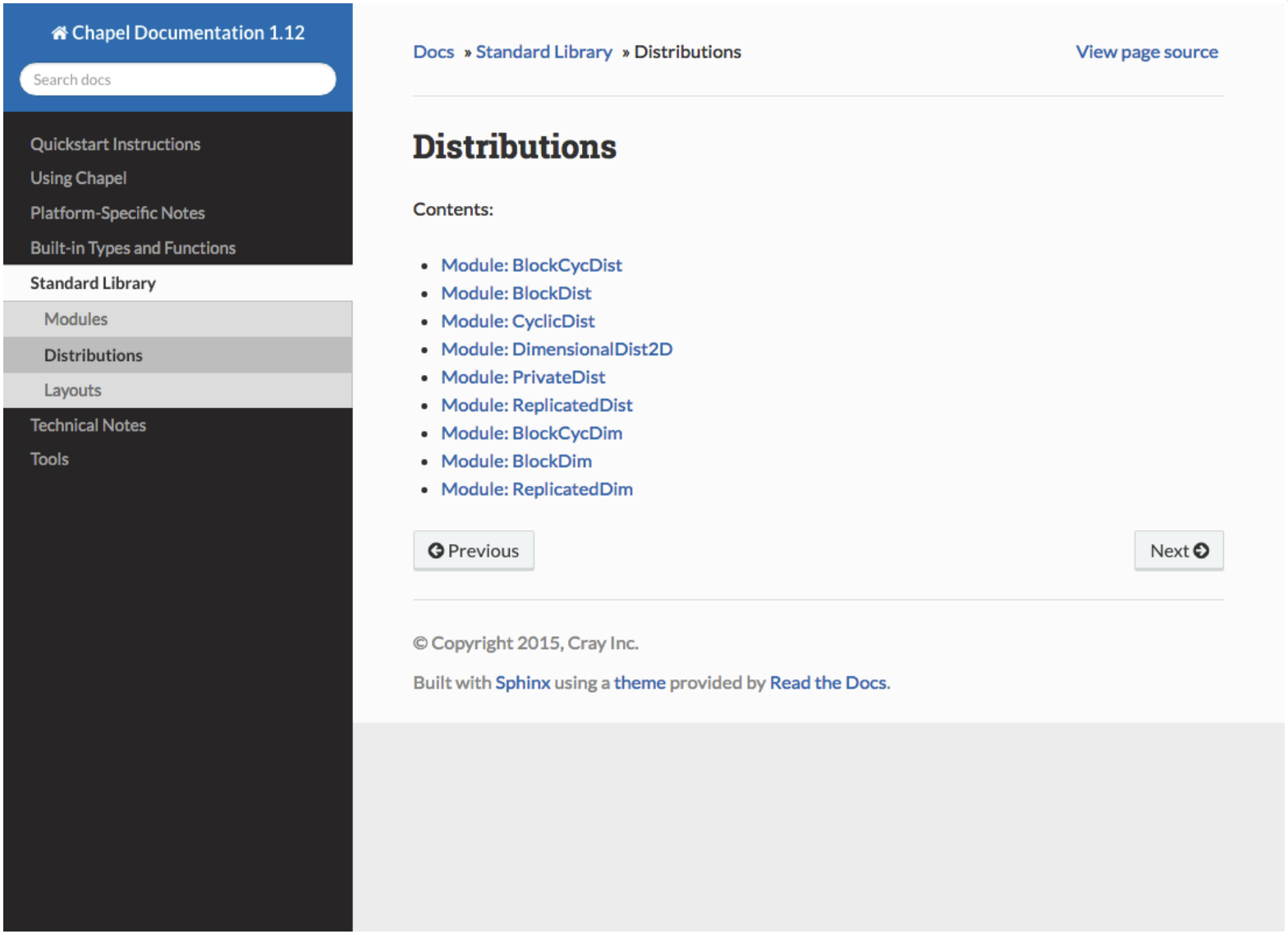
Contents:

- Module: AdvancedIters
- Module: Assert
- Module: Barrier
- Module: BitOps
- Module: Buffers
- Module: CommDiagnostics
- Module: Curl
- Module: Error
- Module: FFTW
- Module: FFTW_MT
- Module: FileSystem
- Module: GMP
- Module: HDFS
- Module: HDFSiterator
- Module: Help
- Module: IO
- Module: LAPACK
- Module: List
- Module: Math
- Module: Memory
- Module: Norm
- Module: Path
- Module: Random
- Module: RecordParser
- Module: Regexp
- Module: Search
- Module: Sort
- Module: Spawn
- Module: Sys
- Module: SysBasic
- Module: Time
- Module: Types
- Module: UtilReplicatedVar

# Standard Modules: 1.13



# Layouts & Distributions: 1.12



Chapel Documentation 1.12

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Tools

Docs » Standard Library » Distributions View page source

## Distributions

Contents:

- Module: BlockCycDist
- Module: BlockDist
- Module: CyclicDist
- Module: DimensionalDist2D
- Module: PrivateDist
- Module: ReplicatedDist
- Module: BlockCycDim
- Module: BlockDim
- Module: ReplicatedDim

Previous Next

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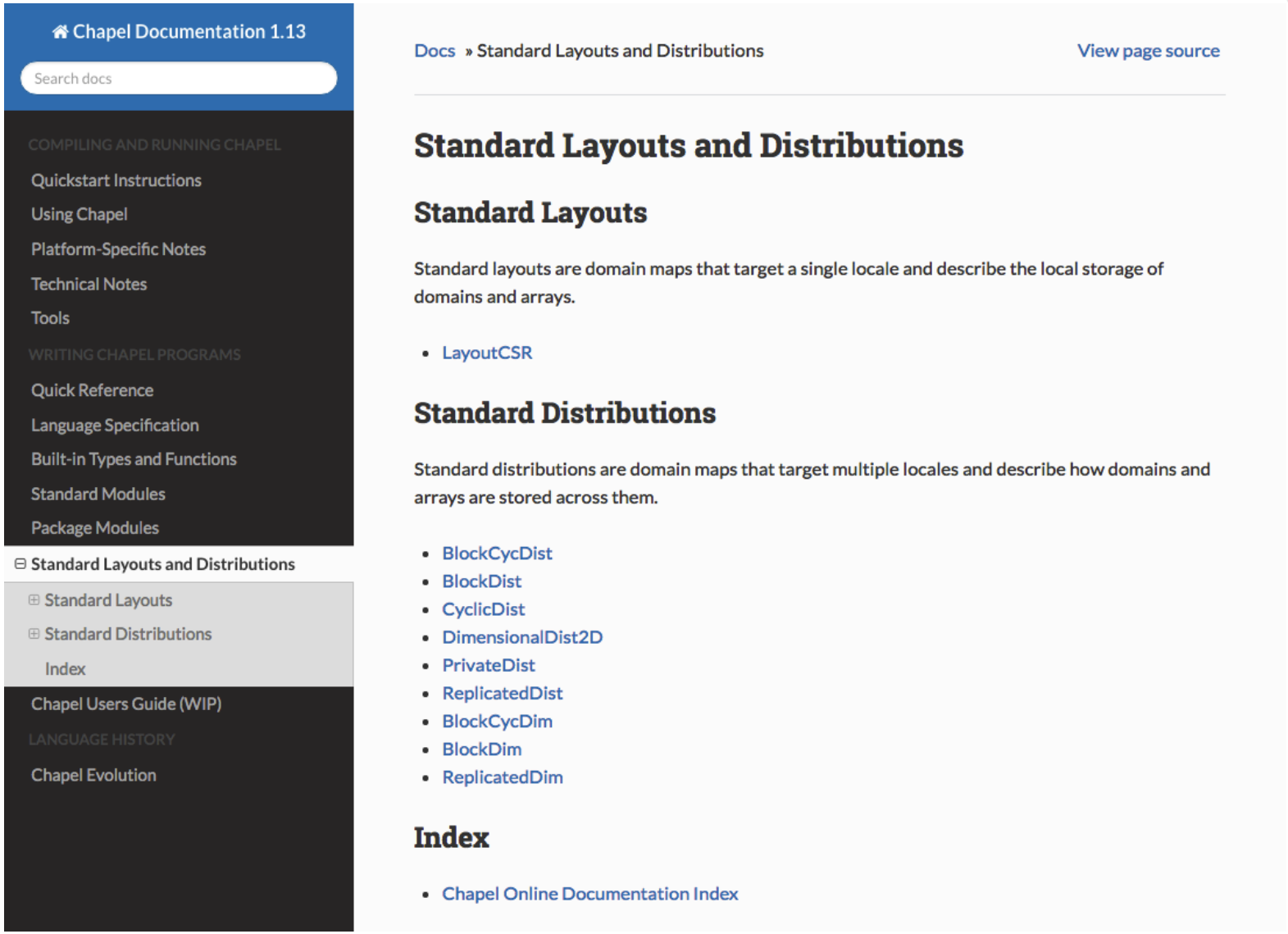
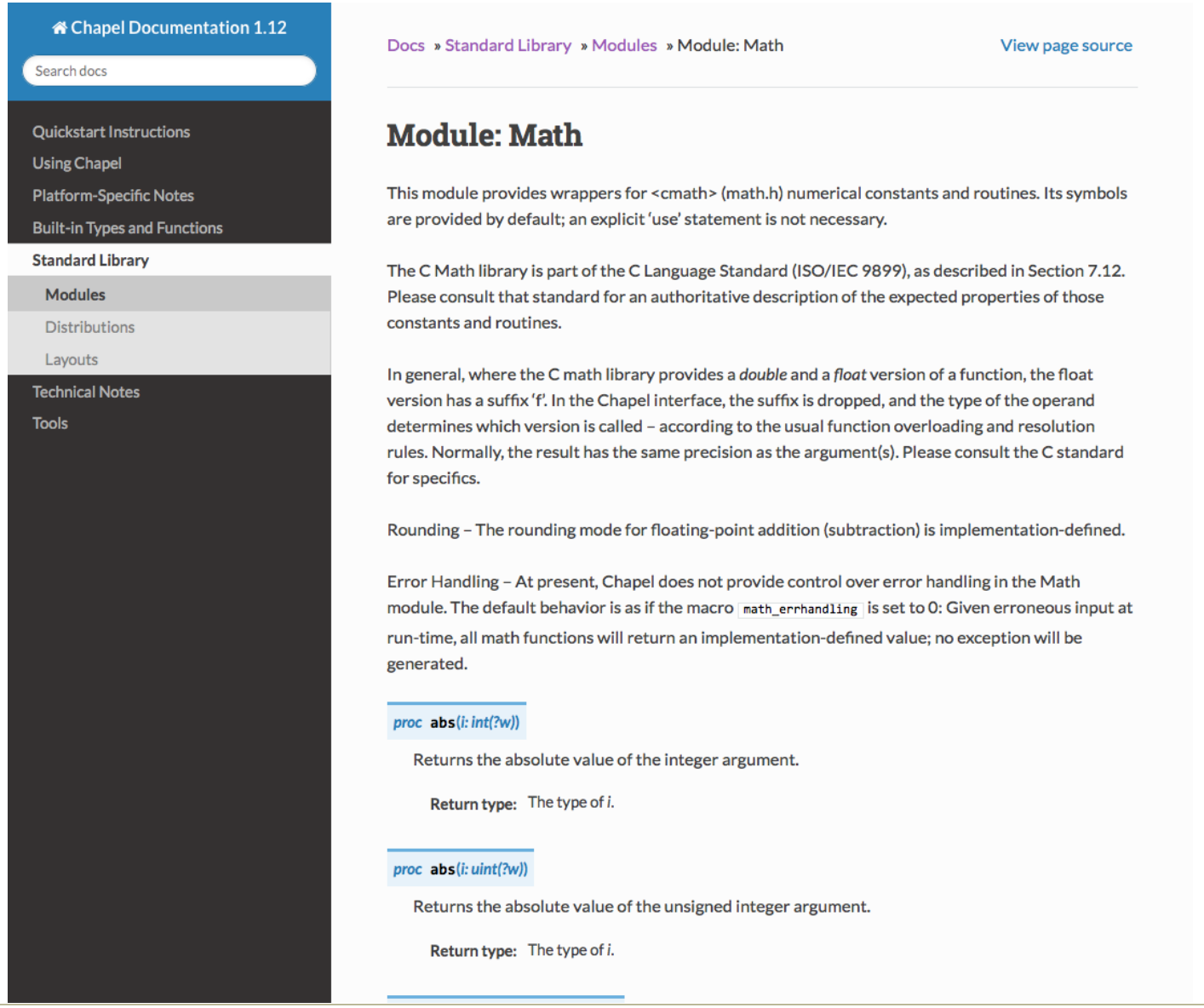
# Layouts & Distributions: 1.13



# Example Module: 1.12



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- Standard Library
  - Modules
  - Distributions
  - Layouts
- Technical Notes
- Tools

Docs » Standard Library » Modules » Module: Math View page source

## Module: Math

This module provides wrappers for <cmath> (math.h) numerical constants and routines. Its symbols are provided by default; an explicit 'use' statement is not necessary.

The C Math library is part of the C Language Standard (ISO/IEC 9899), as described in Section 7.12. Please consult that standard for an authoritative description of the expected properties of those constants and routines.

In general, where the C math library provides a *double* and a *float* version of a function, the float version has a suffix 'f'. In the Chapel interface, the suffix is dropped, and the type of the operand determines which version is called – according to the usual function overloading and resolution rules. Normally, the result has the same precision as the argument(s). Please consult the C standard for specifics.

Rounding – The rounding mode for floating-point addition (subtraction) is implementation-defined.

Error Handling – At present, Chapel does not provide control over error handling in the Math module. The default behavior is as if the macro `math_errhandling` is set to 0: Given erroneous input at run-time, all math functions will return an implementation-defined value; no exception will be generated.

*proc* **abs**(*i: int(?w)*)

Returns the absolute value of the integer argument.

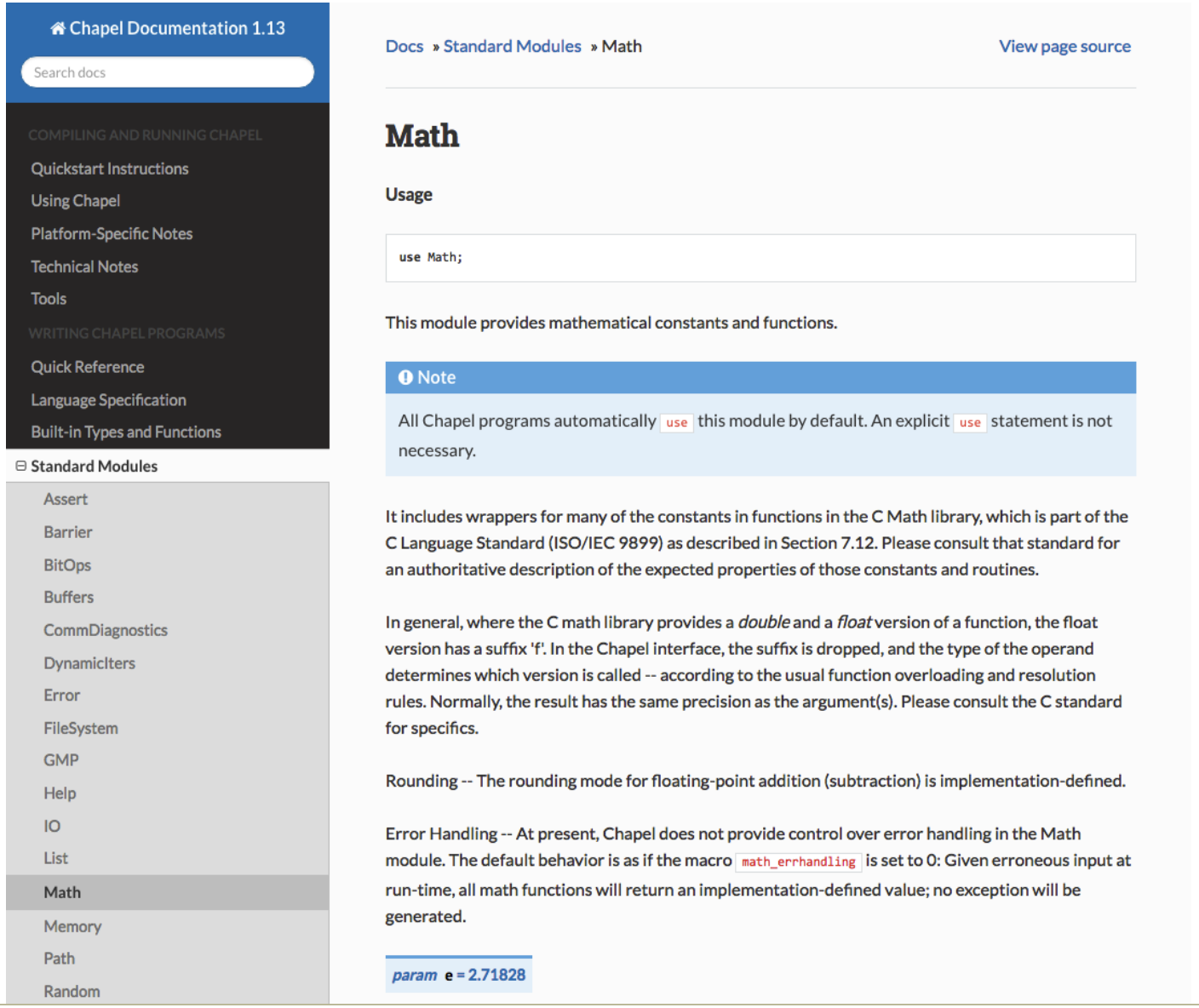
**Return type:** The type of *i*.

*proc* **abs**(*i: uint(?w)*)

Returns the absolute value of the unsigned integer argument.

**Return type:** The type of *i*.

# Example Module: 1.13



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WRITING CHAPEL PROGRAMS
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- Built-in Types and Functions

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- Barrier
- BitOps
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- DynamicIters
- Error
- FileSystem
- GMP
- Help
- IO
- List
- Math
- Memory
- Path
- Random

Docs » Standard Modules » Math — View page source

## Math

### Usage

```
use Math;
```

This module provides mathematical constants and functions.

**Note**

All Chapel programs automatically `use` this module by default. An explicit `use` statement is not necessary.

It includes wrappers for many of the constants in functions in the C Math library, which is part of the C Language Standard (ISO/IEC 9899) as described in Section 7.12. Please consult that standard for an authoritative description of the expected properties of those constants and routines.

In general, where the C math library provides a *double* and a *float* version of a function, the float version has a suffix 'f'. In the Chapel interface, the suffix is dropped, and the type of the operand determines which version is called -- according to the usual function overloading and resolution rules. Normally, the result has the same precision as the argument(s). Please consult the C standard for specifics.

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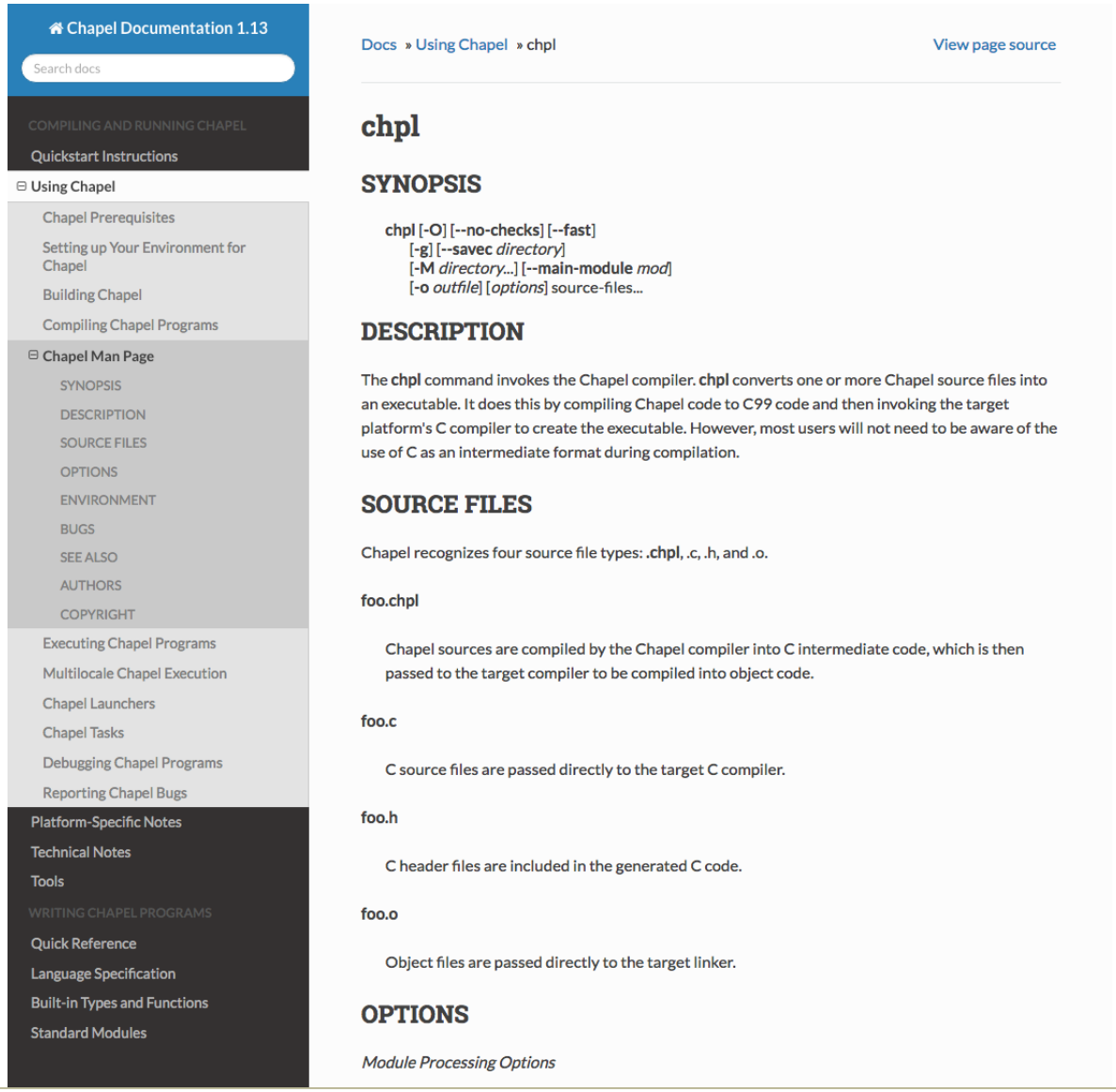
*param* **e = 2.71828**

# Online man pages: New in 1.13



Chapel Documentation 1.13

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- Using Chapel
  - Chapel Prerequisites
  - Setting up Your Environment for Chapel
  - Building Chapel
  - Compiling Chapel Programs
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  - Executing Chapel Programs
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WRITING CHAPEL PROGRAMS
- Quick Reference
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- Standard Modules

Docs » Using Chapel » chpl — View page source

## chpl

### SYNOPSIS

**chpl** [**-O**] [**--no-checks**] [**--fast**]
[**-g**] [**--savec** *directory*]
[**-M** *directory...*] [**--main-module** *mod*]
[**-o** *outfile*] [*options*] source-files...

### DESCRIPTION

The **chpl** command invokes the Chapel compiler. **chpl** converts one or more Chapel source files into an executable. It does this by compiling Chapel code to C99 code and then invoking the target platform's C compiler to create the executable. However, most users will not need to be aware of the use of C as an intermediate format during compilation.

### SOURCE FILES

Chapel recognizes four source file types: **.chpl**, .c, .h, and .o.

**foo.chpl**

Chapel sources are compiled by the Chapel compiler into C intermediate code, which is then passed to the target compiler to be compiled into object code.

**foo.c**

C source files are passed directly to the target C compiler.

**foo.h**

C header files are included in the generated C code.

**foo.o**

Object files are passed directly to the target linker.

### OPTIONS

*Module Processing Options*

# Online Documentation: Next Steps

- **Further improvements to look-and-feel / user interface**
  - Fork ‘read-the-docs’ and fine-tune sphinx template to our needs
    - e.g. drop-down menu for versions
- **Add developer section and/or version**
  - Move developer documentation from repository to online docs
  - Document internal methods not intended for users
- **Increase content coverage**
  - Continue adding online documentation for “built-in” features
  - Improve quality of documentation for existing modules

# Key Web Updates

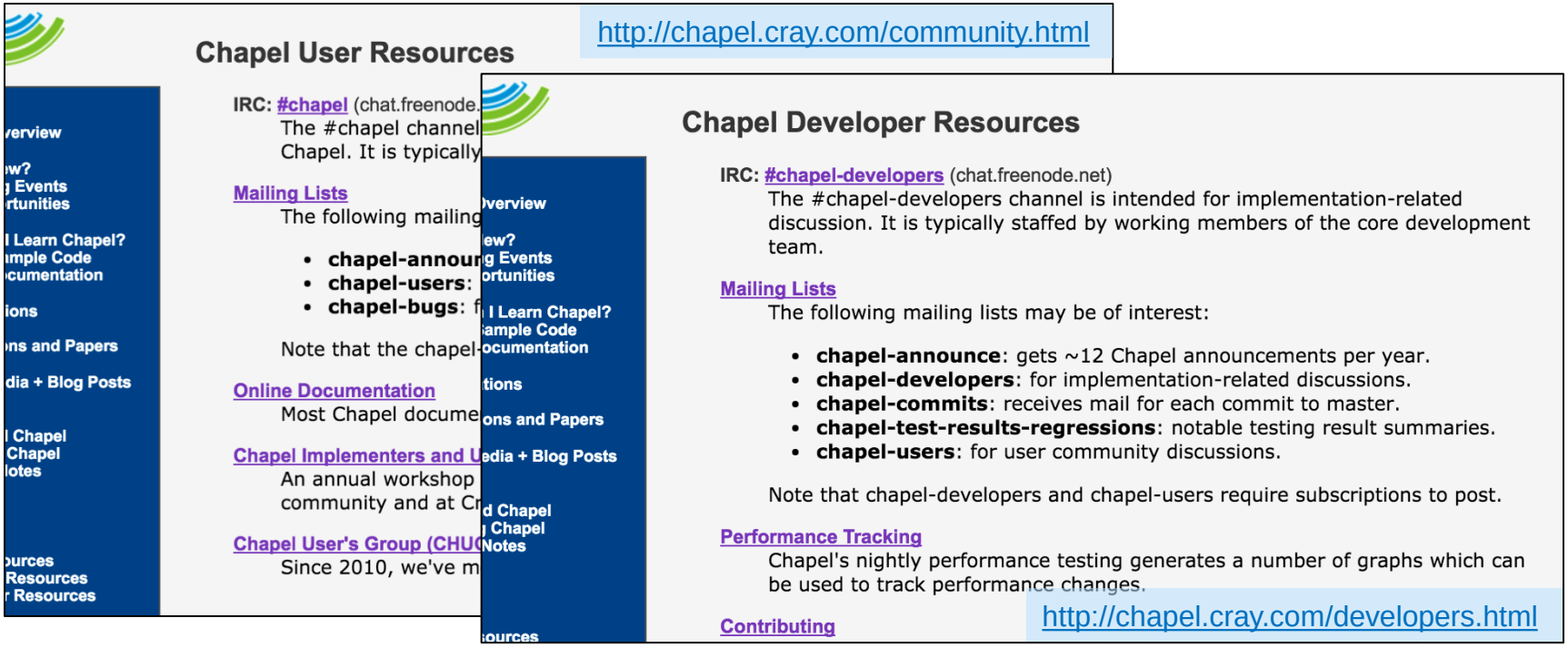
# Web Updates: User / Developer Resources

## Background:

- These pages have existed for awhile, but were wordy and stale

## This Effort:

- Refresh content and make it more concise and approachable



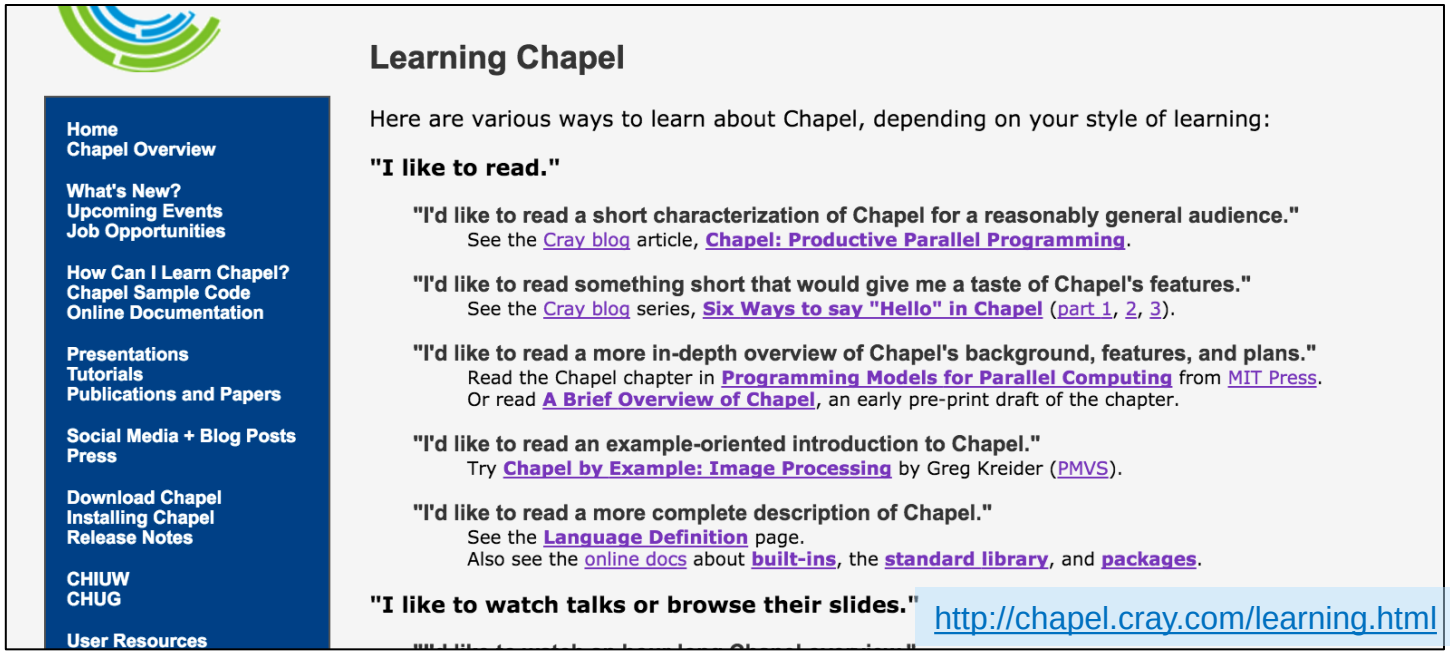
# Web Updates: How Can I Learn Chapel?

## Background:

- This has been increasingly FAQ'd, esp. with blog posts, GSoC, etc.

## This Effort:

- Gathered list of good resources, sorted by learning style
  - e.g., "I like to read" vs. "I'd like to watch talks" vs. "I like to read code"



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Chapel Overview

What's New?
Upcoming Events
Job Opportunities

How Can I Learn Chapel?
Chapel Sample Code
Online Documentation

Presentations
Tutorials
Publications and Papers

Social Media + Blog Posts
Press

Download Chapel
Installing Chapel
Release Notes

CHIUW
CHUG

User Resources

**Learning Chapel**

Here are various ways to learn about Chapel, depending on your style of learning:

**"I like to read."**

**"I'd like to read a short characterization of Chapel for a reasonably general audience."**
See the Cray blog article, **Chapel: Productive Parallel Programming**.

**"I'd like to read something short that would give me a taste of Chapel's features."**
See the Cray blog series, **Six Ways to say "Hello" in Chapel** (part 1, 2, 3).

**"I'd like to read a more in-depth overview of Chapel's background, features, and plans."**
Read the Chapel chapter in **Programming Models for Parallel Computing** from MIT Press.
Or read **A Brief Overview of Chapel**, an early pre-print draft of the chapter.

**"I'd like to read an example-oriented introduction to Chapel."**
Try **Chapel by Example: Image Processing** by Greg Kreider (PMVS).

**"I'd like to read a more complete description of Chapel."**
See the **Language Definition** page.
Also see the online docs about **built-ins**, the **standard library**, and **packages**.

**"I like to watch talks or browse their slides."**

http://chapel.cray.com/learning.html

# Chapel Users Guide

# Users Guide: Background and This Effort

## Background:

- Have intended to write a users guide for some time now…
  - goal: more readable, less formal intro to Chapel than the language spec

…yet, it's such a major undertaking that it's been hard to get started

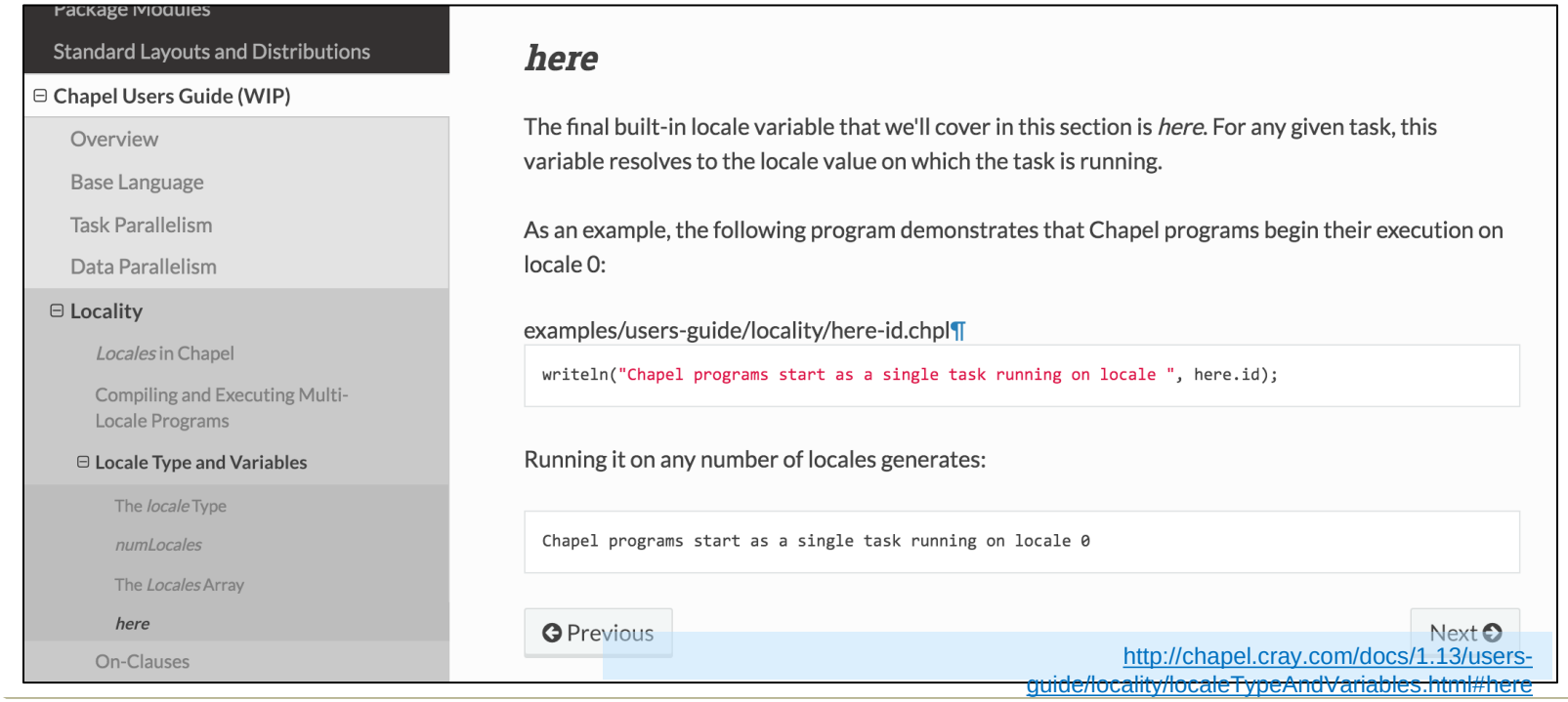
## This Effort:

- Motivated by user comments at CHIUW 2015
  - enthusiasm for first round of online documentation in v1.11
  - desire for similar online documentation covering Chapel language itself
- Last year's chpldoc / Sphinx effort made it easier to get started
  - Sphinx trivially supports...
    - ease of writing via .rst files
    - online deployment, searching
    - ability to trivially include testable code examples
  - Also supports writing "a page per topic" rather than "a whole new book"
  - To that end, started writing the users guide this release cycle

# Users Guide: Status

## Status:

- Taking a breadth-first approach
  - goal: cover key features earlier, yet without ignoring the base language
- Wrote 8 entries so far, available in online docs
  - response to existing docs has been positive

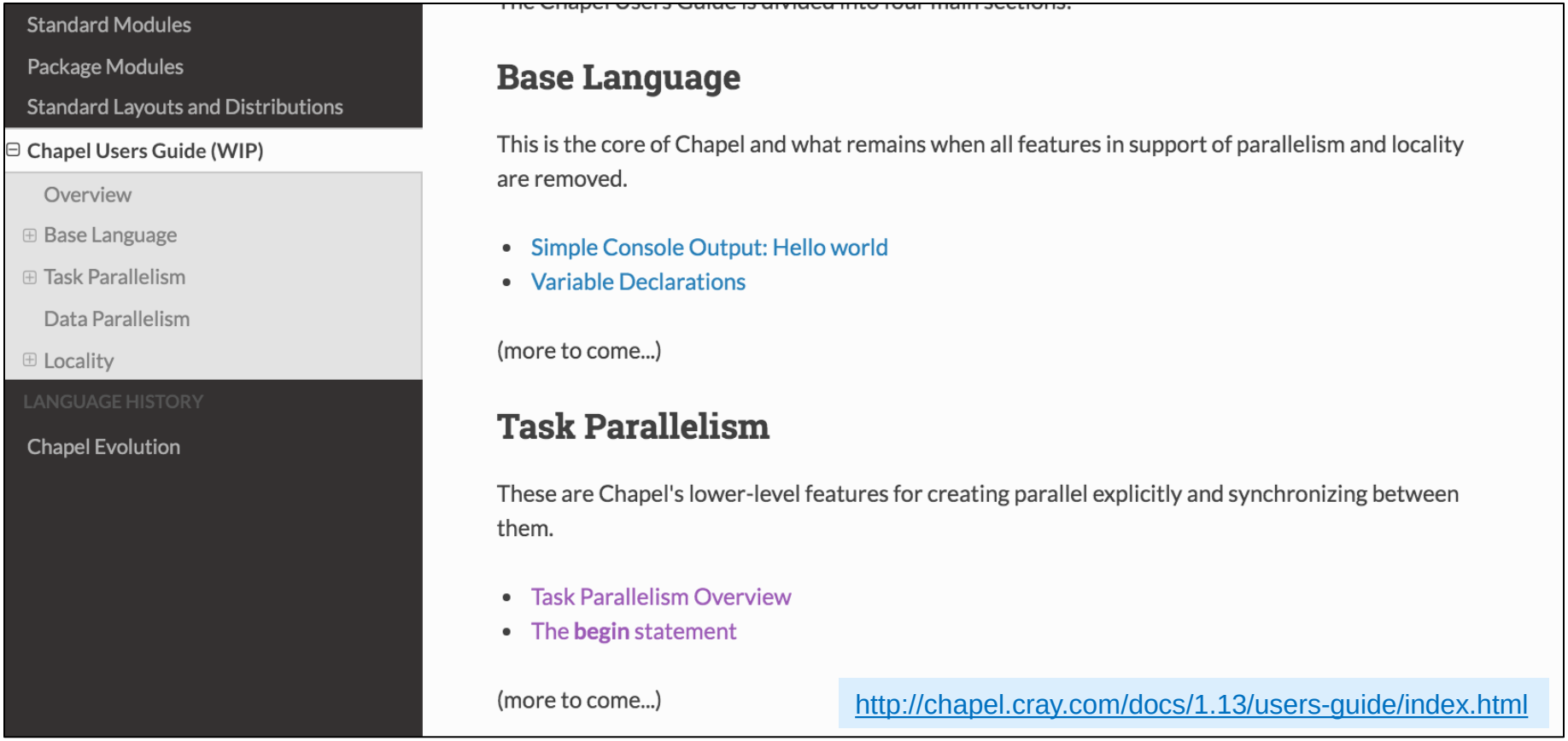



http://chapel.cray.com/docs/1.13/users-guide/locality/localeTypeAndVariables.html#here

# Users Guide: Next Steps

## Next Steps:

- Continue writing, strive to write a few entries per week



# Other Documentation Improvements

# Other Documentation Improvements

- **Split "quick start" information out of top-level README**
  - README.rst
  - QUICKSTART.rst
- **Converted more README-style files to markdown:**
  - ACKNOWLEDGEMENTS.md
  - CHANGES.md
  - CONTRIBUTORS.md
  - PERFORMANCE.md
- **Example test updates**
  - Added ISx and LCALS, improved MiniMD (see benchmarks slides)
  - Fixed typos and improved explanations in primer examples
  - Extended the linkedList example to support additional methods (contributed by Akash Thorat)
  - Updated example tests to reflect language and library changes
  - Retired README.features

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