Other Notable Changes

Chapel Team, Cray Inc.
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Outline

● **Portability Improvements**
  ● Chapel on 64-bit ARM
  ● Other Portability/Platform Improvements

● **Syntax Highlighting Improvements**

● **Bug Fixes**

● **Error Message Improvements**

● **Launcher Improvements**

● **Third-Party Improvements**
Chapel on 64-bit ARM
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**Background:** Chapel has not previously supported 64-bit ARM

**This Effort:** We ported to 64-bit ARM for a single locale

- Created architecture description files
- Enhanced the build environment for 64-bit ARM
- Used a newer release of Qthreads that is 64-bit ARM-aware

**Impact:** The following environment setting enables the port

```
CHPL_TARGET_ARCH=aarch64
```

**Next Steps:**

- Enhance the port to include multi-locale programs
- Study and optimize for ARM
- Add power-aware features
Other Portability/Platform Improvements
Other Portability/Platform Improvements

- Improved the portability of the code base to gcc 6.x
- Improved portability to various UNIX environments:
  - Ubuntu, FreeBSD, Solaris, Illuminos, OmniOS
- on Crays, removed hugepages warning for GASNet
  - previously, generated a warning when craype-hugepage module used
  - combination caused link errors, but was fixed in GASNet 1.26.0
- On Crays, enabled the module to work with CLE 5 and 6
Syntax Highlighting Improvements
Syntax Highlighting Improvements

- Added alternative vim highlighting install instructions
  - alternatives to .dotfile edits for Vundle and vim-plug users
- Fixed portability of emacs highlighting for emacs 24.x
- Fixed highlighting of nested block comments for emacs
- Fixed highlighting of binary literals in Pygments
- Updated support for Andre Simon’s highlighter to v3.x
  - used by Computer Language Benchmarks Game site
Bug Fixes
Bug Fixes

- CONFIG_SITE broke some third-party builds
- **atomic bug fixes:**
  - ‘compare_exchange’ conforms to memory order reqs on failure
  - fixed incorrect ‘fetchAdd’ and ‘fetchSub’ implementations
  - fixed incorrect 64-bit atomic loads on 32-bit systems
- **privatization had a longstanding, infrequent race condition**
- **‘ref’ bug fixes:**
  - fixed a bug in handling of ‘ref’ return intents
  - fixed a bug involving ‘ref’s to array elements
- **fixed a bug in recursive functions returning records**
- **fixed a bug in accessing overridden methods**
- **strided, uint(*) domain/array iteration was broken**
More Bug Fixes

- BlockCyclic array accesses for 3+D arrays were broken
- Membership queries for CSR domains had a bug
- Fixed a bug with storing max(int) in domain(int)
- Arrays in records were being incorrectly localized
- \((+/-1)^k\) was incorrect for negative \(k\)
- Fixed a bug in advancing I/O channels
- Fixed bugs mapping GMP routines down to C versions
- Fixed a bug ‘use’ing an enum within a library module
- String-to-value casts were not ignoring whitespace
- Fixed back-end compiler warnings about dead code
Yet More Bug Fixes

- **I/O bug fixes:**
  - readline()s ‘amount’ argument was being used incorrectly
  - writeln(str) and writef(“%s”, str) behaved differently for binary I/O

- Added some missing variables to ‘printchplenv --sh’

- Reduced auto-‘use’ of standard modules in user code

- Fixed some issues in copy propagation

- Fixed occasional failures in inserting wide references

- sleep() would sometimes under-sleep by 1 microsecond

- Fixed bugs with the --llvm-wide-opt flag

- Fixed a bug in locale models and order of resolution
v1.13.1 Bug Fixes

- Released June 2016
  - Motivated by new race condition in 1.13.0 causing lossy reductions
- fixed ‘extern’ block support for C function pointers/structs
- re-enabled --cpp-lines when not saving generated code
- fixed a bug in ‘remove()’ on arrays
- vector operations now preserve index sets correctly
- fixed idxType/eltType mix-up in ‘shuffle()’ in ‘Random’
- fixed close-before-wait issue in ‘Spawn’ channels
- fixed open() when the path was stored remotely
- fixed bug in printing real floating point values
- GMP bug fixes
Error Message Improvements
Error Message Improvements

● Made string OOB messages print the bad index
● Squashed noisy back-end C compiler warnings
● Errored on declaring constructor/init() procs w/out parens
● Added an error for user fields named ‘outer’
● Fixed some spelling errors in error messages
● Removed warnings for assigning serial things to arrays
● Removed a bad warnings about records and forall intents
Launcher Improvements
Launcher Improvements

● Added an --spmd flag to the ‘mpirun’ launcher
  ● Designed for use with new MPI module

● Added new flags to ‘slurm_gasnet_ibc’ launcher
  ● --walltime, --partition, --exclude

● Fixed a race in the ‘pbs-aprun’ lancher

● Improved handling of backtics in env. vars. for ‘amudprun’
Third-Party Improvements
Third-Party Improvements

- Added ‘libunwind’ as a new third-party package
  - supports new backtrace capability

- Upgraded jemalloc to version 4.2.1
  - enabled decay-based purging
  - improved detection of ‘librt’ when using ‘cray-prgenv-*’ compilers
  - disabled statistics gathering by default

- Upgraded GASNet to version 1.26.4

- Upgraded Qthreads to version 1.11
  - added support for new ‘distrib’ scheduler

- Upgraded hwloc to version 1.11.4

- Updated MassiveThreads to a new version
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