

CCSM4/CPL7 and CLM Development

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Outline

- What are the advantages of the CPL7 architecture - focus on CLM
- What is different about the CPL7 architecture?
- What does this mean for upcoming CLM development?

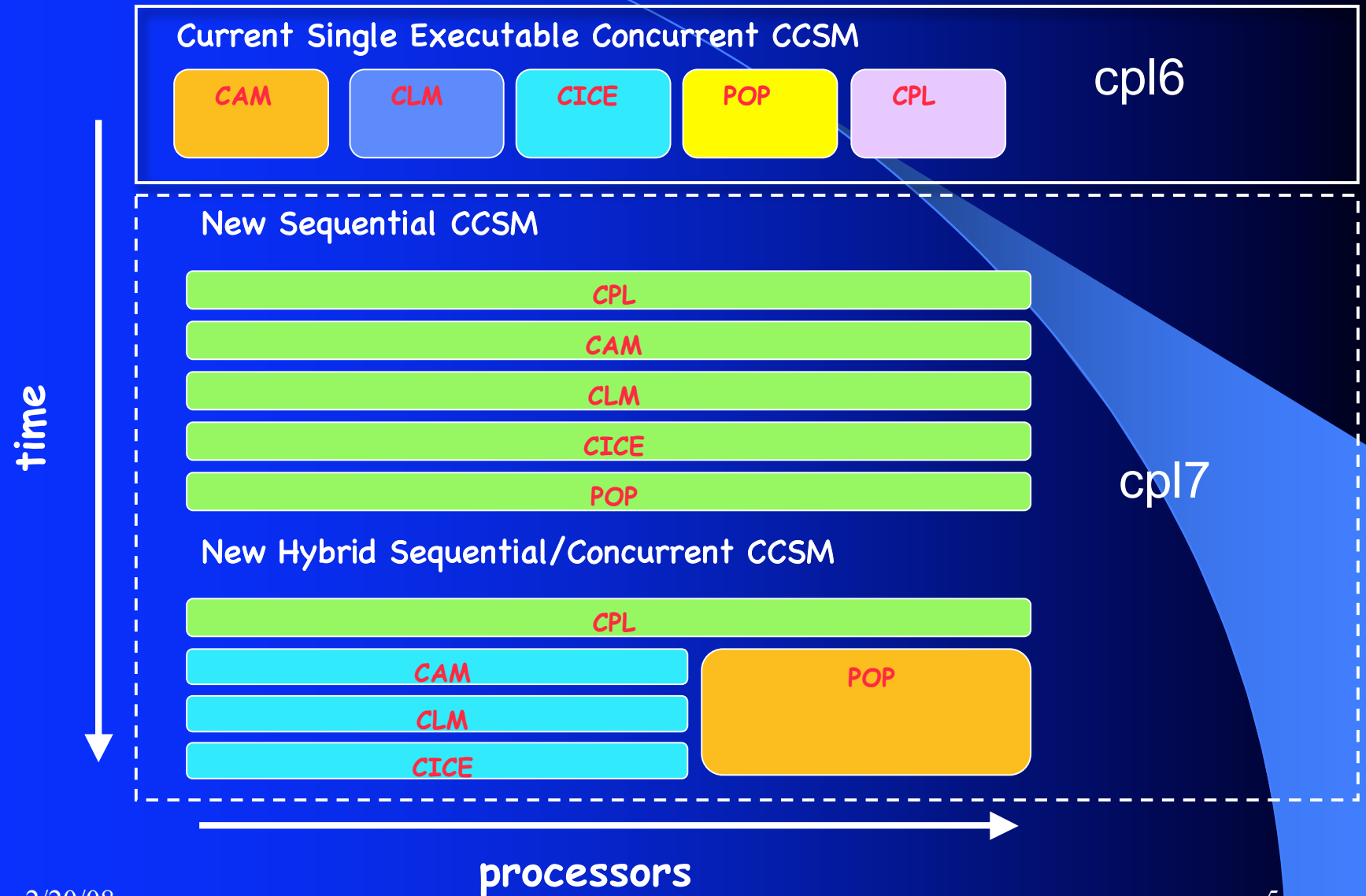
Advantages of New CPL7 Architecture

- **Scientific unification**
 - Eliminates separate stand-alone component code base results in improved scientific consistency
 - CPL7 architecture has been incorporated into ALL CCSM components - "offline" CLM is now a CCSM4 configuration using CLM/DATM7 communicating with CPL7 driver
 - Increases code reuse and maintainability- no longer need to support multiple coupling implementations - only one coupling interface for
 - CLM running in "offline" mode, "stand-alone" CAM, fully prognostic system
 - New constituents that need to be communicated between CLM and atm/ocn components
 - Lowers cost of support/maintenance
- **Simplicity**
 - Easier to load balance, debug and port
 - Improved timing utilities (Pat Worley and Jim Edwards)

Advantages of New CPL7 Architecture (cont)

- Performance and Memory Scalability
 - Design addresses new tight coupling scientific requirements between CLM/CAM/CICE
 - Design targets a wide range of hardware
 - New low memory, massively parallel peta-scale hardware
 - Smaller Linux clusters
 - Laptop
- New flexible coupling strategy
 - Simple run time configuration for processor layout
 - Capability to swap coupling frameworks
 - Will support both ESMF (contingent on Stage 2 evaluation) and MCT

Overview of CPL7 Design



Implications for CLM Development

- New capability for “end-to-end” development process in one source code tree
 - ALL experiments previously done with CLM offline driver can now be done with CPL7/DATM7 code (including single gridcell)
 - Single gridcell, regional and global (including finemesh) “offline” CLM simulations
 - “Stand-alone” CAM (CAM/CLM/DOM/PresCICE) simulations
 - Fully prognostic CAM/CLM/CICE/POP simulations
- Testing advantages:
 - CLM development code is now able to run as part of offline tests, CAM stand-alone tests and CCSM tests from one directory tree - AND- as part of pre-tag process
- Production run advantages
 - CCSM production scripts will now accompany CLM tags

CPL7 Status

- Validation:
 - Successful first pass validation of all active component relative to CCSM3 - longer simulation needed
- Porting:
 - CPL7 ported to NCAR IBM's, BlueGene, XT4, Linux clusters
 - CPL7 system is currently being used to carry out the LLNL Grand Challenge simulations on LLNL Atlas cluster (.25° atm/.1° ocean)
- Plan:
 - Migrate completely away from CCSM3/CPL6 within the next several months