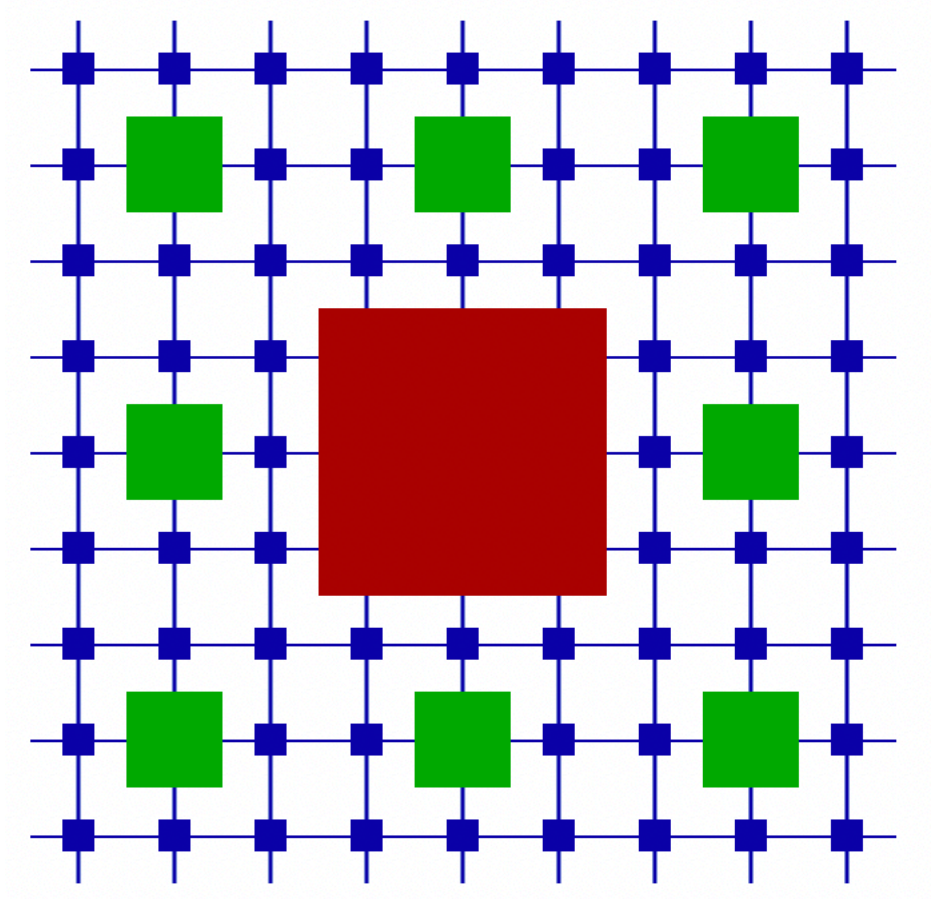# CarpetX:
Carpet ∪ AMReX

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Cactus

- Cactus is a modular software framework for scientific computing
  - The Einstein Toolkit uses Cactus
- A **driver** component manages:
  - Memory allocation
  - I/O
  - Schedule user functions
  - Reduction, interpolation
- The driver usually talks to a lower-level library to actually do things
- Cactus itself manages only metadata

AMReX

- Current main driver is **Carpet**, based on **CarpetLib** AMR library

- AMReX made very similar design choices as CarpetLib

- Advantages of AMReX over CarpetLib:
  - Efficient flux registers (for refluxing)
  - Mature GPU support (is it?)
  - (Support for) elliptic solvers
  - Actively developed, funded
  - Larger user community

CarpetX

- A **driver** for Cactus
- Translates between Cactus (declarative data structures) and AMReX (function calls), keeping metadata state
  - Schedules user functions
  - Allocates memory
  - Decides grid structure
  - Synchronizes ghost zones
- *Performs consistency checks for scheduled user functions*
- Implements reduction (easy) / interpolation (non-trivial)

CarpetX

- Augments AMReX with additional prolongation/restriction operators
- Implements Silo-based I/O

~~CarpetX~~

- Checkpointing / recovery

- GPU support (see Philipp)

- Subcycling in time (do we want it?)

- Benchmarks, in particular for synchronization, prolongation, regridding

- DGFE for higher order methods