# Milestone 3:
## Dynamic Speed & Voltage Scaling for GALS Processors

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## Outline

- Milestone Objective
- Methodology
- Milestone update

# Milestone Objective: Dependency Checker

- Original dynamic speed adjustments for the functional units were dependent only upon the absolute queue length
- Add check for number of ready instructions in the queue for each functional unit
  - Need to determine high and low thresholds
- Add check for number of direct dependencies for executing instructions
  - Need to determine threshold

# Methodology (1/4)

- Added counters to each functional unit
  - Number of dependencies on instruction in functional unit
    - int_dep_cnt, mem_dep_cnt, fp_dep_cnt
  - Number of independent instructions in the FU issue queue
    - int_idep_cnt, mem_idep_cnt, fp_idep_cnt

## Methodology (2/4)

- When each instruction is dispatched to the issue queue of a functional unit (gals_*_dispatch2)
  - If no dependency is associated with it, increment independent counter
  - Else, increment dependent counter of the source of the dependency

## Methodology (3/4)

- When an instruction is written back (gals_*_wb)
  - Wake up waiting entries in the issue queue
  - Decrement dep counter of functional unit that committing instruction is dependent on
  - Increment idep counter of issue queue that the dependent instruction is waiting in

## Methodology (4/4)

- When an instruction commits (gals_*_commit)
  - Decrement idep counter of function unit that it was issued to

## Determining Parameters

- Need to determine values for:
  - High and low thresholds for independent instructions in each issue queue
  - High threshold for dependencies of each functional unit
- To determine variables values:
  - Iterate through possible values for each variable, holding all other variables constant

## Milestone Update

- Incorporated dependency checking across functional units into speed/voltage adjustments of DVS algorithm
  - Few bugs to be sorted out
- Need to determine optimal values of parameters for the enhanced algorithm

## Questions?