

18544: Network Design and Evaluation

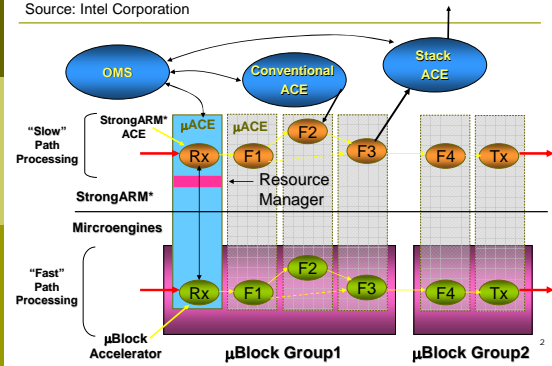
Project Design Discussion

Sept 14, 2006

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Constructing Network Applications

Source: Intel Corporation



Modularity

- Break up project in separate modules
 - Clear definition of functionality
 - Agreed upon APIs
- Reduces overall complexity
- Helps team work in parallel
- Supports piece-wise testing and debugging
 - Test each piece before integration

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Key Design Decisions: Core versus Microengines

- Core is easier to program but is very slow
 - Path between core and microengines is also very slow
- Placement of operations should be guided by (1) frequency of execution and (2) need to be "real time".
 - Core should only be used for operations that are needed for a small % of the packets, e.g. 0.01%
 - Operations on the core incur longer delays, i.e. asynchronous relative to the flow of packets

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Key Design Decisions: Choice of Memory

- Registers: very few of them.
 - Used mainly for staging data
 - Limit the scope of the registers
- SRAM: reasonably fast
 - For control data structures
- SDRAM:
 - Optimized for access to contiguous data, e.g. packets

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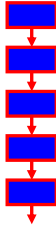
Key Design Decisions: Data Structures

- Each project has at least one important data structures.
 - Hash table, indexed array, linked list, ...
- Design depends on the most common access patterns.
 - E.g. maximize performance of per-packet operations
- Data structure is often accessed by both core and microengines.
 - Per-packet use versus management

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Project Organization

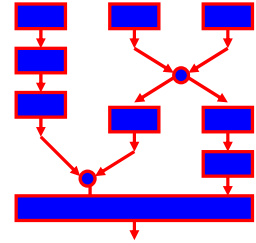
- Simple projects are typically organized as a sequence of tasks.
 - Simple to plan
 - Simple to measure progress
- This does not work for team projects!
 - Cannot keep all team members productive
 - For each problem you encounter, the entire team will be forced to wait



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Organizing Your Team

- Need as many parallel tasks as there are team members.
- Each component must be quite independent from the others.
 - Can be implemented and tested independently
 - Interfaces must be defined jointly
- Integrate components as they are completed.
 - Joint testing



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