Motivation

- Dataflow execution on mobile devices:
  - Parallelism
  - Adaptability
  - Safety

Parallel execution

- Data parallelism
- Software pipelining
- Changing power budgets
- Effectively hardware changes at run time!
- Scheduling by:
  - Compiler
  - Thread scheduler
  - Application
  - How to make it safe?

Timing analysis

- Coarse
  \[ E : T \]
  \[ E_1 : T_1 \]
  \[ E_2 : T_2 \]
  \[ (E \ ? \ E_1 : E_2) : T + \max(T_1, T_2) \]

- Fine
  \[ E : (S,S') \Rightarrow (T,T') \]
  \[ E_1 : (T,T') \Rightarrow (T_1,T_1') \]
  \[ E_2 : (T,T') \Rightarrow (T_2,T_2') \]
  \[ (E \ ? \ E_1 : E_2) : (S,S') \Rightarrow (\min(T_1, T_2), \max(T_1', T_2')) \]

- Abstract Machine

Conclusion: We can

- Describe safe executions
- Constrain schedules to be safe

http://www.surprise-lang.org