

Tasks and combinators

Modules of constrained workflow management

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Content



Motivation and principles
 Hierarchical distributed workflows
 Domain-specific language





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Programming CPS



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Independent, side effect free modules

- Predictive model, decision making under uncertainty
- Error in abstraction gives rise to stochasticity
- Failure in hardware, software, network
- Changing conditions in the physical world





Cyber-Physical Systems as workflows



- Smoothly executing in a distributed environment
- Testability, dependability
- Dynamic construction of workflows
- Tasks are first class citizens















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Controlling a (sub-)system



Unstable values are raised in sequences





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Domain-specific language



```
Kettle control.set coil(on) >>|
par [rec Kettle_control.read_thermometer(i) >>= t \rightarrow
     continue with t
    | i ← [1,2,3]]
controlled by (acc, ts) \rightarrow
  average(ts) >>= t \rightarrow
  if
    † > 97 →
      Kettle control.set coil(off) >>|
      t;
    acc – t > error threshold \rightarrow
      Kettle control.set alarm(on) >>|
      Kettle control.set coil(off) >>|
       (error, t)
    else
      continue with (t, t)
with accumulator 0 @ [kettle].
```



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Summary



Paradigm based on side effect free modules

- Hierarcalizaledistribulaectwopksitivesal
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 - Set asideri Poteraipreperificicombinators
 - Synthed algo and prediction
 - DSL embedded in Erlang



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