today's RESEARCH is tomorrow's REALITY

Microsoft Research
mobile + cloud
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MiST: A Platform for Mobile-Cloud Computing in Streams

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Cloud: Unleash the Power of Mobile

Reduce the overhead of continuous operations

Leverage massive parallel computing resources

How to make programming easy in M+C?

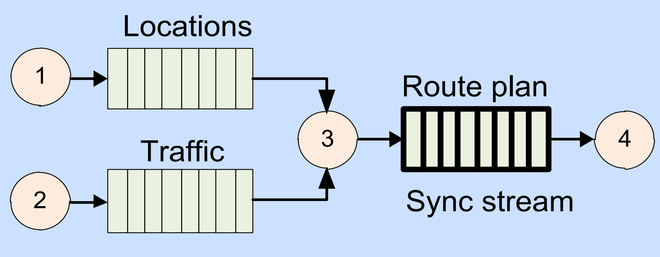
Stream as a First-Class Citizen

```
//stream construction, define "schema"
Stream<T> X = new Stream<T> (Query, interval);
//relational model: stream as table
//also fit well for data-parallel computing in cloud
var X = from x in X where P(x) select F(x);
//event-driven model: update triggers new ops
//annotation: execution place; scoping: scope of stream
[Cloud] var Z = when X or Y[latest 1 day]… select F(x, y);
```

Code Snippet: Continuous Route Planner

```
[Mobile] Stream<Location> locations = …; //①
[Cloud] Stream<Traffic> traffic = …; //②
[Cloud] Stream<Plan> plans =
        from l in locations combine t in traffic
        select MakePlan(l, t);  //③
//consumption, functional reactive programming (FRP)
[Mobile] plans.Subscribe((Action<Plan>)Update); //④
```

Data Flow Graph (DFG)



Advantages of Stream Abstraction

Ease of application development

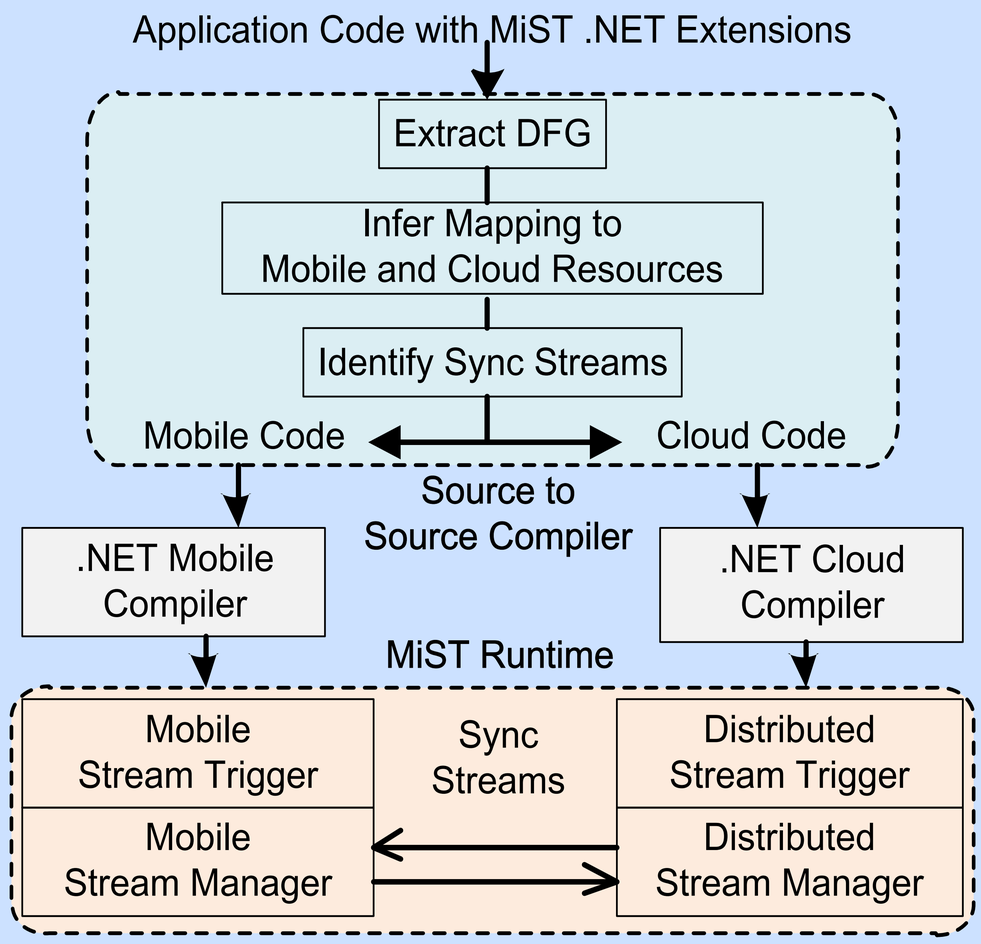
Combine imperative, declarative, and FRP languages

Sync stream hides the communication complexity

Leverage advances in distributed systems and database

Stream filter/slacks; Stream layout; Stream partition

MiST Architecture



Current Status

Implemented MiST and four applications

Validated the effectiveness of stream-based optimizations

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