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TouchDevelop: “Basic” for Devices and Services

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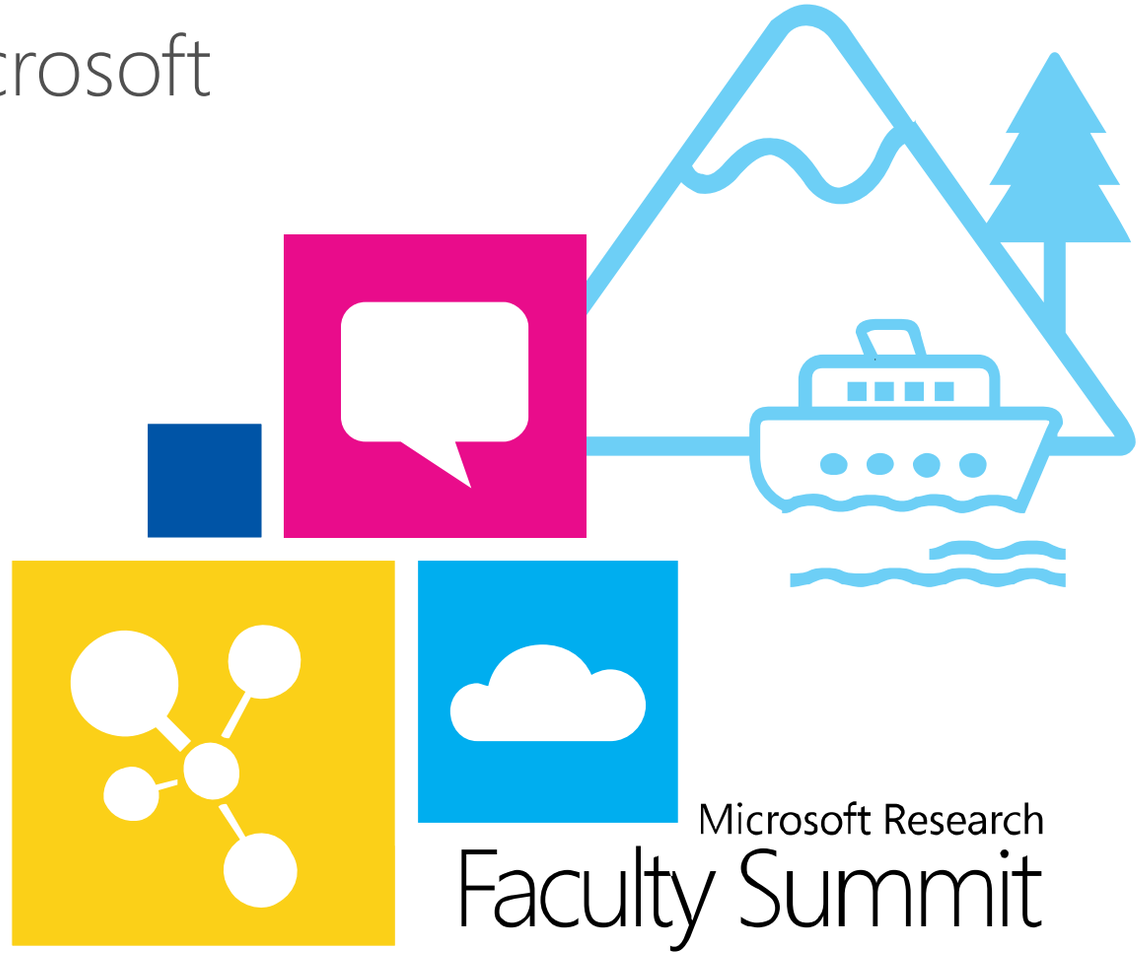

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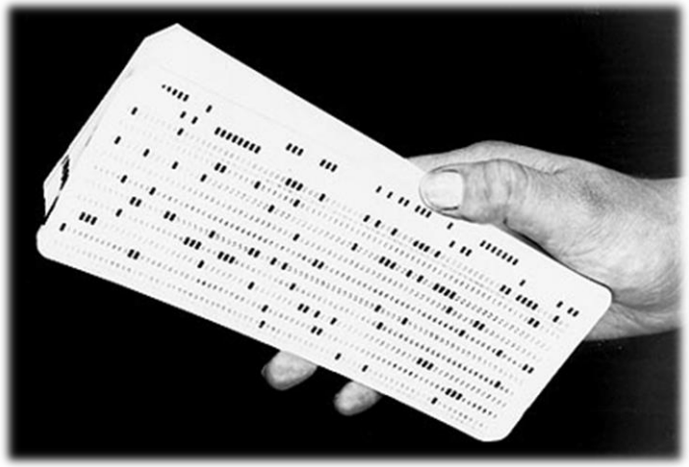
Input devices shape programming languages + editors



```
    **** COMMODORE 64 BASIC V2 ****

 64K RAM SYSTEM  38911 BASIC BYTES FREE

READY.
10 PRINT "HELLO WORLD"
20 GOTO 10
RUN
```

VS

TouchDevelop (touchdevelop.com) is…

- a simple statically-typed safe programming language
- a browser-based IDE, implemented in TypeScript
- a set of high-level APIs for sensors, data, services, …
- a cloud of programmers, scripts, users, data, bugs, …

Three challenges

1. Youth of today = programmers of tomorrow
2. Transforming data into interaction
3. Abstractions for distributed state

1. Youth of today = programmers of tomorrow

- First computers are touch-first devices (phone, tablet)
- Can we enable youth to program on such devices?

www.touchdevelop.com

Demo

Programming with one finger

touch**develop**.com

280,000+
app downloads

80,000+
registered u

25,000+
published scripts

http://appday.org/

2. Transforming data into interaction

- How can we make it easy to create data-centric user interfaces on devices?

- Live programming [PLDI 2013]
  - model-view-controller supported by language abstractions

Demo

Live programming with boxes

Paradigm Shift

Single computer to (cloud) clusters + mobile

3. Abstractions for distributed state

sharing data in the cloud
makes apps more social,
fun, and convenient.

But what about disconnection,

synchronization, consistency?

just tag your data as ‘cloud’,
we synchronize and merge

The research

- How to formalize the consistency model?
- How to visualize and implement consistency?
- How to write programs for this model?

Eventually Consistent Transactions (ECT)
An abstract consistency model [ESOP '12]

Revision Consistency
An implementation technique reminiscent of source control systems [ESOP '11,'12]

Cloud Types
Defining Structured EC Data [ECOOP '12]

Demo

Cloud types

Other challenges, current research…

plug-ins for cloud development

mining data to help new users learn programming,

clone detection, analyze small incremental changes, gamification

leverage structured program code repository

better version control (diff, merge), real-time group editing

current research focus

automatic code splitting for distributed execution (mobile vs. cloud),

direct editing of JavaScript or TypeScript, debugger

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University Phone Loan program

Summary

touchdevelop is popular

260,000+ app downloads, 80,000+ registered users, 23,000+ published scripts

embraces new reality

language and editor designed with mobile and touchscreen in mind
sharing and learning with friends in the cloud
runs on Windows Phone, PC, Mac, iPad, iPhone, Android, …

great for teaching/learning, new research opportunities

mobile devices enable and require new approaches to software development

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