TouchDevelop: “Basic” for Devices and Services

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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
280,000+ app downloads
80,000+ registered users
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
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
• 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
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
Runs everywhere, available now!

touchdevelop.com
Courses, book, slides

available for free online

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touchdevelop.com/teach

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