How do you create high-quality software with transient, potentially malicious workers of varying expertise?

What if a large application could be built in a day?

- Increasing **parallelism** reduces time to market
- **microtasks**
  - secs - mins
  - modular
  - self-describing
  - may fail
  - recursively spawned

What if grandma or grandpa’s hobby was writing software?

- reducing range of knowledge required enables **specialization** through editors or in expertise
- some artifacts edited by EUP w/ EUP tools
- expert architect contributes for a few microtasks
- workers become expert in sort routines

How can work be effectively allocated to a crowd?

worker characteristics, **task** characteristics
- experience w/ relevant artifacts
- skill in type of programming
- reputation / trust
- overall knowledge of system

best available match vs. wait for better match

- **secs - mins**
- **modular**
- **self-describing**
- **may fail**
- **recursively spawned**

What if software development felt like a game?

- **optimal** challenge + **social** might make building software more fun & educational
  - earn as many **points** as you can
  - level up to harder work
  - cash in points for **prizes**
  - watch how your **friends** are doing
  - compete in pair programming

How can a crowd create a design with conceptual integrity?

- push & pull information over the **dependency** graph
- iterative critique - many solutions, **critique**, recombine, iterate
- collective decision making - StackOverflow for a project

How do you create high-quality software with transient, potentially malicious workers of varying expertise?

- redundancy, reviews, reputation
- apportion **value created** back to contributors
  - function reused
  - function passes all its tests
  - user story completed quickly

**Crowd Development**

Thomas D. LaToza¹, W. Ben Towne², André van der Hoek¹, and James D. Herbsleb²

¹ University of California, Irvine
² Carnegie Mellon University

Non-expert players solved a decade long heard research problem in 10 days.