Microsoft® Research
FacultySummit

A Tour of Dafny

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FUTURE WORLD
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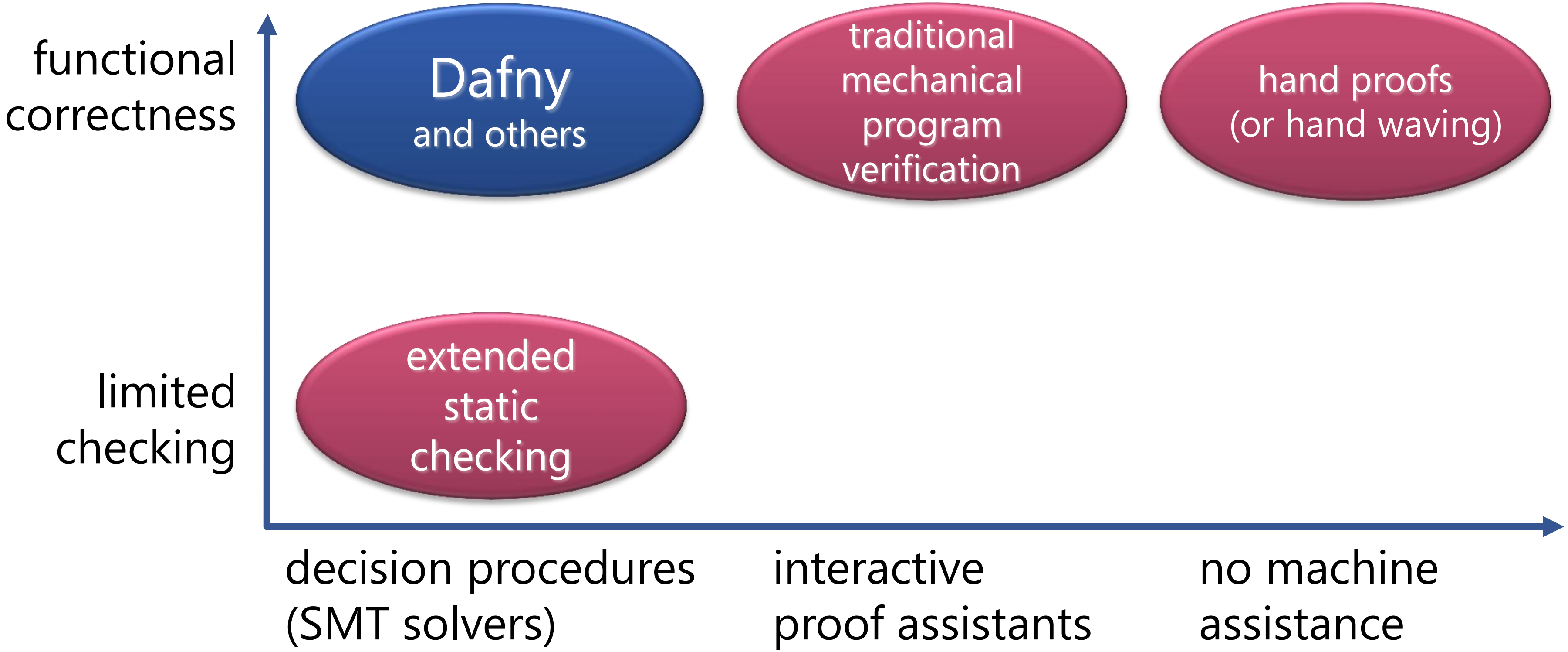
Reasoning about programs

- Central to any programming task
  - From safety critical applications to scripting
  - From initial development to maintenance to debugging
- Minimizes faults, security problems, time/cost to market
- Thinking skill

- How do we teach?

Program verification


functional correctness
limited checking
Dafny
and others
traditional mechanical program verification
hand proofs (or hand waving)
extended static checking
decision procedures (SMT solvers)
interactive proof assistants
no machine assistance

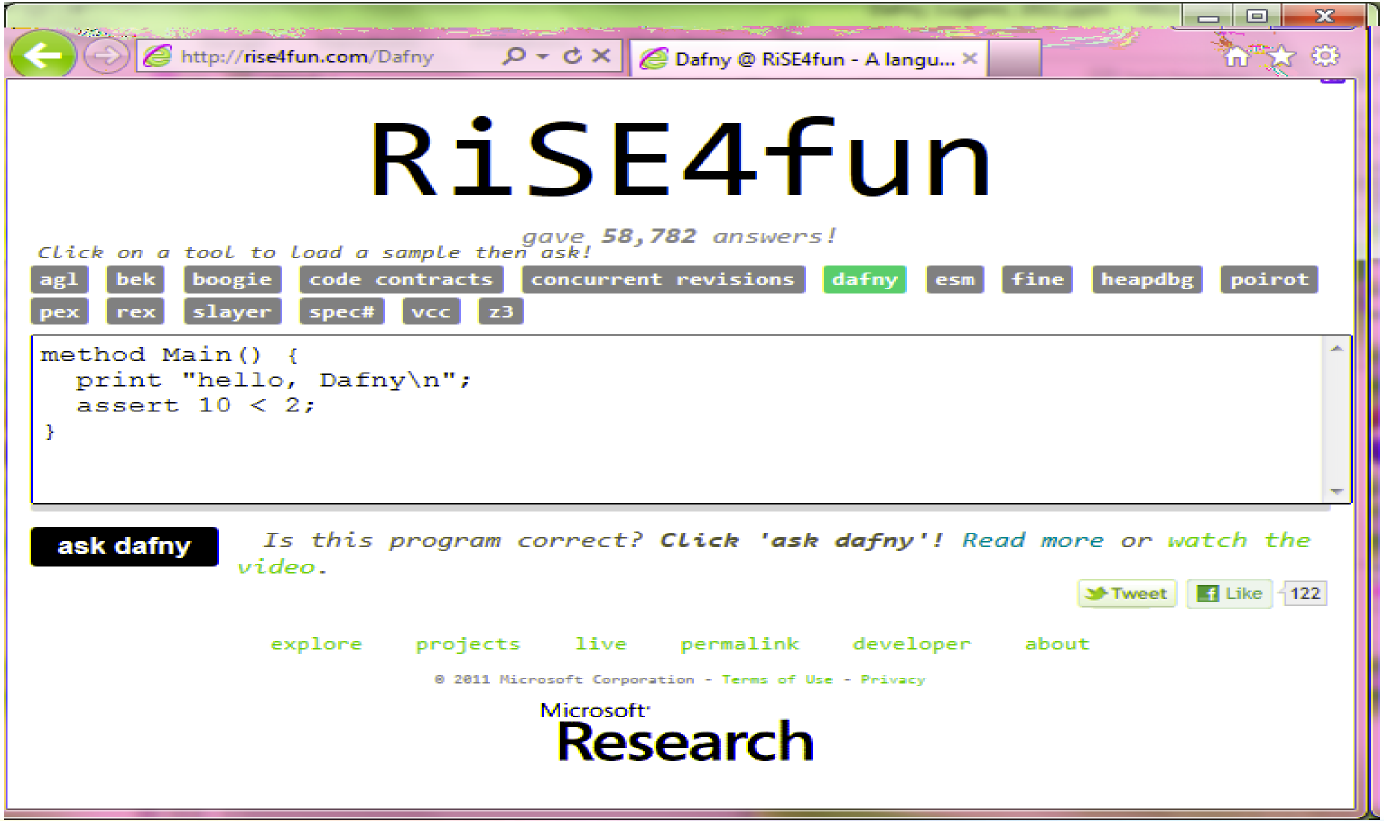
Dafny

- Object-based language
  - generic classes, no subclassing
  - object references, dynamic allocation
  - sequential control
- Built-in specifications
  - pre- and postconditions
  - framing
  - loop invariants, inline assertions
  - termination
- Specification support
  - Sets, sequences, inductive datatypes, …
  - User-defined recursive functions
  - Ghost variables

DEMO

Dafny

Use tools without installation



RiSE4fun

gave 58,782 answers!

Click on a tool to load a sample then ask!

```
method Main() {
  print "hello, Dafny\n";
  assert 10 < 2;
}
```

Is this program correct? Click 'ask dafny'! Read more or watch the video.

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References

- Tools:
  - Dafny: research.microsoft.com/dafny
  - Spec#: research.microsoft.com/specsharp
  - VCC: research.microsoft.com/vcc
- Tools in browser:
  - Rise4fun.com
- Verification Corner (videos on verification)
  - research.microsoft.com/verificationcorner

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