Death, Taxes, and Formal Verification

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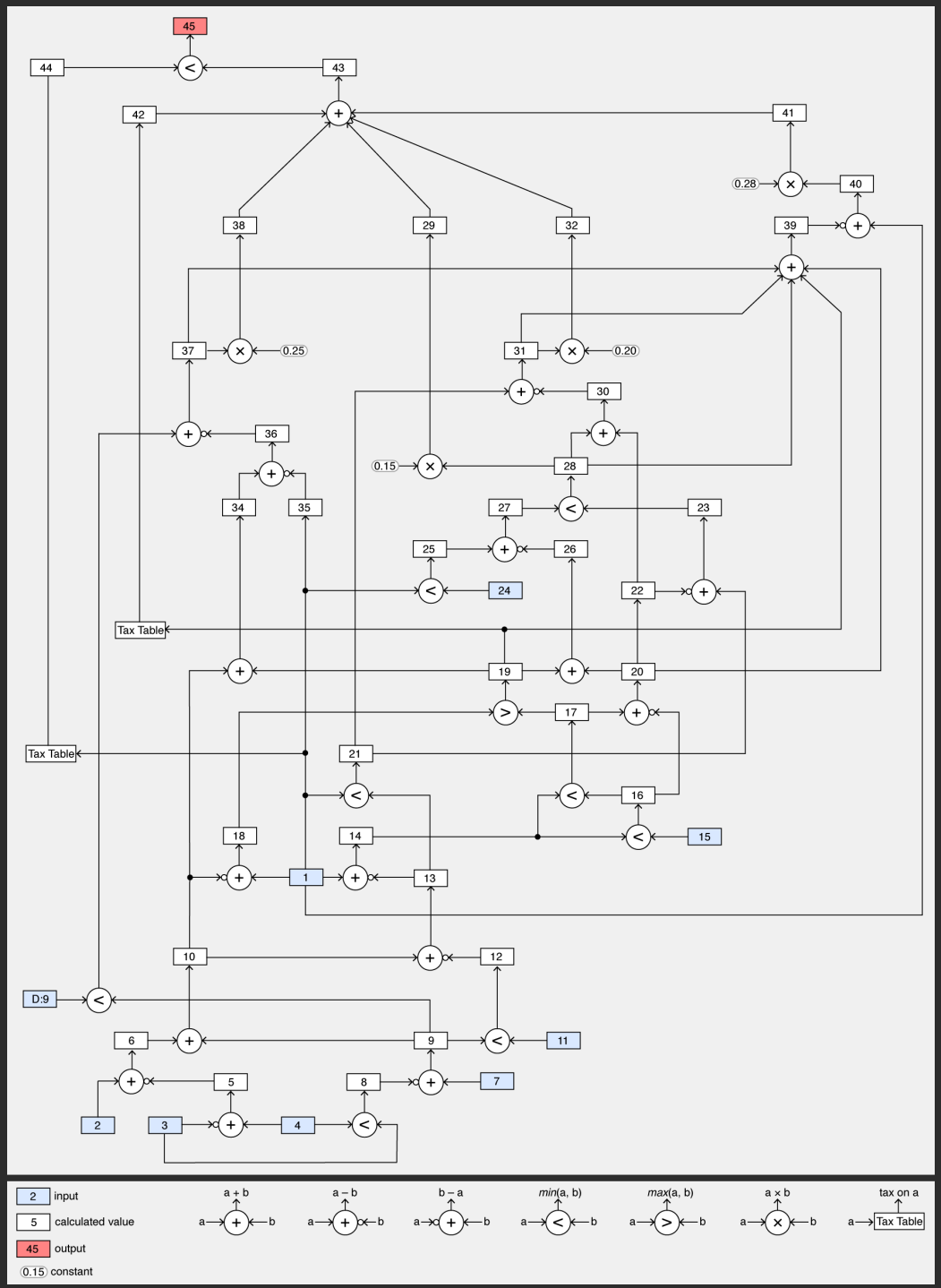
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Tax Table
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Tax Table
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14
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1
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10
12
D:9
6
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11
5
8
7
2
3
4
2 input
5 calculated value
45 output
0.15 constant
a + b
a – b
b – a
min(a, b)
max(a, b)
a × b
tax on a
Tax Table

(Brian Hayes)

A quirk of the US tax code

US corporations pay US tax on worldwide income

- But only when money re-enters the US
- Result: incentive for corporations to keep funds abroad

Corporations want to declare headquarter abroad

- Standard technique: inversion
- Merge with a foreign "headquarter" ("Google Ireland")

Corporations want to move foreign funds to US

- Tax free, of course!
- Should be impossible, but is it?

The original bug

"Killer B"

- Transaction swapping cash/shares of four companies
- Result: Foreign assets to US tax free!
- Patch: "Anti-Killer B" Rule (IRS 2006-41)
- Patched again (IRS 2007-48)

Problem solved?

Seven years later...

"Anti-Killer B" + "Helen of Troy"

- "Helen of Troy" rule taxes companies that move abroad
- Special rule: Anti-Killer B and Helen of Troy can't both fire...

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Result: A tax free inversion!

Problem solved?

The tax code: not the world's best program

Can we formalize (some of) it?

- Piles of definitions and rules
- Rules about rules, combinations of rules, etc.

Reason about policies

- Policy: foreign assets must be taxed when they come back
- Policy: companies must be taxed when they invert

PL tools?

- Provenance/information flow?
- Reasoning about data from different worlds?