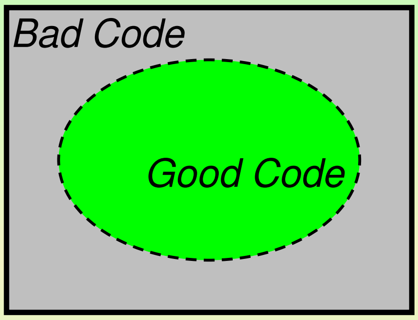
CS520, Handout 12, 5 Oct 2006

Retrospection

What Are Typing Systems Good For?

Writing code in your favorite programming language ...



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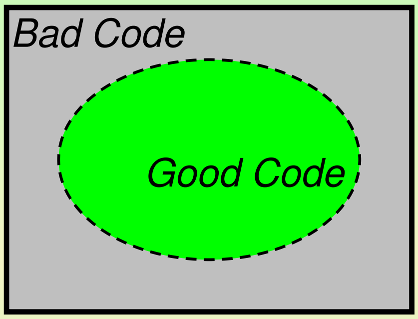

Bad Code =
cannot be compiled, or can be compiled but harmful to run.

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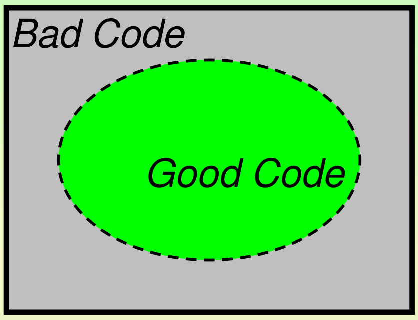

Good Code =

- can be compiled and executed,
- never passes data to a function that does not know how to use it,
- never passes data to a function that is not authorized to use it,
- never passes data to a function that uses it more than once,
- never passes data to a function that over-writes it to memory,
- etc. . . . . . .

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•These invariants are written in a formal syntax and can therefore be manipulated with the same rigor as any other formal system.

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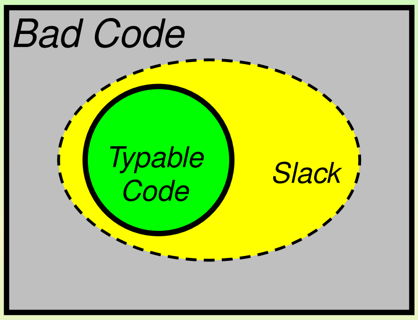

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good code that never breaks formal type-specified invariants.
Slack =
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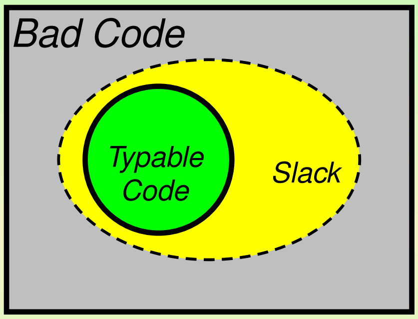

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The ***slack*** contains all code that is unfairly rejected. The need to minimize it is a major driving force in the development of new type systems.

But the new type systems can become unduly complex, with many bad consequences.

Desirable properties of a type system:

1. Static discipline, i.e., code is judged type-safe at compile time.
2. Types are “easy” to write and insert into programs.
3. Types are “easy” to understand.
4. Type-checking (for fully type-annotated programs) is efficient.
5. Type-inference (for untyped or partially typed programs) is efficient.

Unavoidable tension between these different requirements.