

# CSE 341: Programming Languages

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Lecture 19— Introduction to Smalltalk

# Today

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Why Smalltalk?

Some basics of smalltalk programs

- Syntax
- Messages
- Blocks
- Classes and Methods
- Dynamic Dispatch
- self and super

Section: The Squeak environment (projects, saving your work, etc.)

# Smalltalk

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- Pure object-oriented
- Class-based
- Dynamically typed

A good starting point for discussing what each of these means and what other languages look like.

The language has been quite stable since 1980.

Other points:

- A tiny language; easy to learn almost all of it
- A complete commitment to dynamic changes; little abstraction support

# Overview of Smalltalk

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1. All values are *objects*
  - Even numbers, code, and classes
2. Objects communicate via *messages* (i.e., methods)
3. Objects have their own state
4. Every object is an instance of a class
5. A class provides behavior for its instances

This sounds a lot like Java, but smaller.

It's also much more like Scheme than it seems; we'll return to "what really makes something OO"

But first we need to get "the feel for Smalltalk"

# Syntax

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```
exp ::= atom | assign
      | unarySend | infixSend | keywordSend
      | ( exp ) | exp . exp | ^ exp
```

```
atom ::= ID | literal | block
```

```
literal ::= INTEGER | STRING | ...
```

```
block ::= [:ID1 ... :IDn | exp] | [ exp ]
```

```
assign ::= name := exp | name _ exp
```

```
unarySend ::= exp ID
```

```
infixSend ::= exp OPERATOR exp
```

```
keywordSend ::= exp ID1: exp ... IDn: exp
```

## Some key ideas

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- Really, everything is an object
- Blocks are lambdas
- Return ( $\uparrow$ ) is special
- Everything is “dynamic” – evaluation can add/remove classes, add/remove methods, etc.
- Dynamic typing
- Dynamic dispatch
- Sends to `self` (a special identifier; Java’s `this`)

## Protection?

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- Fields are inaccessible outside of instance
- All classes and methods are available to everyone
- No namespace management; category has no semantic significance