
Essentials of Programming Languages

<https://proglang.informatik.uni-freiburg.de/teaching/konzepte/2018ss/>

Language 5 – minijs

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A simple dynamically typed object language

We consider a simple object-oriented language, minijs, with dynamic typing, simple objects and methods.

Objects are collection of methods. Each method can take multiple argument and return a result. `send` can be used to call the method of an object. If the method doesn't exists or the number of arguments don't match, the evaluation should not proceed. Method names are arbitrary symbols. Numbers are objects that have method nameds “+”, “-”, ...

Design the rest of the grammar and write a small-step semantics. Is your semantics call-by-value or call-by-name? Do not forget to write tests.

Hint You might need to modify the substitution function provided last time.

$e ::= x$	Variables
(object (meth ($x \dots$) e) ...)	Object
(send e meth e ...)	Method call
$number$	Numbers

Exercise 1 (Recursion with “this”)

Add the special variable `this`. How do you need to modify your semantics?

Exercise 2 (Lambdas as objects)

Implement lambdas as methods that have only one method: “call”. Implement them by only adding a meta-function and without changing neither the grammar nor the semantics.

Exercise 3 (Object members and updates)

Add members to objects. First consider “functional updates”: an update returns a new object where the member has been changed. How would you implement in-place updates?

Exercise 4 (Additional builtin)

Add new builtin values such as booleans, strings, ...