Concept: Metaprogramming

Headline

The activity of writing metaprograms and related activities

Details

Metaprogramming is to metaprograms what programming is to programs. The programs manipulated by metaprograms are also referred to as object programs. The representation of object programs in metaprograms is also referred to as object-program representation.

Illustration

See the concept of metaprograms for an illustration.

Metadata

- metaprogram
- object program
- object-program representation
- Vocabulary: Programming
- Vocabulary: Metaprogramming
- http://en.wikipedia.org/wiki/Metaprogramming
**Concept:** Metaprogram

**Headline**

A program that manipulates programs

**Illustration**

Consider the following simplify for arithmetic expressions, written in `Language:Haskell`:

```haskell
-- Simple arithmetic expressions
data Expr = Const Int | Add Expr Expr
    deriving (Eq, Show)

-- Simplification for unit law of addition
simplify :: Expr -> Expr
simplify t@(Const c) = t
simplify (Add (Const 0) x) = simplify x
simplify (Add x (Const 0)) = simplify x
simplify t@(Add x y) =
    if t==t'
    then t
    else simplify t'
where
    t' = Add (simplify x) (simplify y)
```

For instance, the simplifier works as follows:

```haskell
> simplify (Add (Const 20) (Const 22))
Add (Const 20) (Const 22)
> simplify (Add (Const 0) (Const 42))
Const 42
```

The simplifier is a metaprogram, as it is a program that manipulates another program. The metalanguage used here is `Language:Haskell`. The object language used here is `Expr`, the language of expression.

See the concept of reflection for a more specific form of metaprogramming for further illustrations.

**Metadata**

- Concept
Concept: Programming

Headline

The activity of writing programs and related activities

Metadata

- Vocabulary: Programming
- Vocabulary: Software engineering
- Concept
**Concept:** Program

**Headline**

An executable software artifact that solves a certain problem

**Description**

According to a classic definition, a program is (Document:Principles of information systems) "a sequence of instructions written to perform a specified task with a computer". This style of definition is possibly too much focused on an imperative view of programming.

More intuitively, more inclusively, and shorter: a **program** is an executable software artifact that solves a certain problem (that is amenable to automation on a computer). For instance, a program may solve an algorithmic problem.

A **program** may count as a "small" software system or an (executable) software component. A "proper" software system or component typically comprises of multiple software artifacts that may be elements of different software languages, may or may not be elements of programming languages, may reside at different levels of abstraction, and may interact in various ways.

Strictly speaking, a **program**, as far as this term is used in practice, may very well also break down into multiple software artifacts because of, for example, modular programming. Thus, the line between **programs** and software systems or (executable) software components is somewhat blurred.

**Illustration**

See the Hello world program for a very simple program.

**Metadata**

- Software artifact
- Vocabulary:Programming
- Vocabulary:Software engineering
Concept: Object-program representation

Headline

The representation of object programs in metaprogramming

Metadata

- metaprogramming
**Concept: Object program**

**Headline**

A program manipulated by a metaprogram

**Headline**

- metaprogramming
- metaprogram
- object-program representation