

Software transformation and generation

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Traversal strategies and other operators

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Reflective operators

- **all(s)** , applies **s** to each direct subterm of a given constructor, fails if the application to one of the subterms fails
- **one(s)** , applies **s** to exactly one direct subterm
- **some(s)** , applies **s** to as many direct subterms as possible and at least one, fails if the application to all of the subterms fails

Traversals are a combination...

```
topdown(s)      = s; all(topdown(s))
bottomup(s)    = all(bottomup(s)); s
innermost(s)   = bottomup(try(
                  s; innermost(s)))
alltd(s)       = s <+ all(alltd(s))
downup(s)      = s; all(downup(s)); s
downup(s1, s2) = s1;
                all(downup(s1, s2));
                s2
```



exhaustive

Preserving terms

```
if s1 then s2 else s3 end
```

```
= where(s1) < s2 + s3
```

```
or(s1, s2) =
```

```
if s1 then try(where(s2))
```

```
else where(s2) end
```

```
and(s1, s2) =
```

```
if s1 then where(s2)
```

```
else where(s2); fail end
```

Full strategy language

```
repeat(s, c) =  
  (s; repeat(s, c)) <+ c
```

```
repeat-until(s, c) =  
  s; if c then id  
    else repeat-until(s, c) end
```

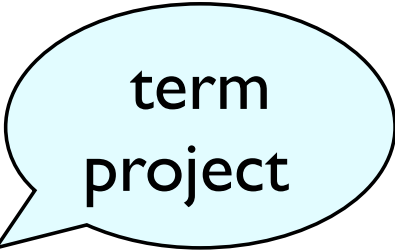
```
while(c, s) =  
  if c then s; while(c, s) end
```

```
do-while(s, c) =  
  s; if c then do-while(s, c) end
```

Switch

```
switch s0
  case s1 : s1'
  case s2 : s2'
  ...
  otherwise : sdef
end
```

Pre-defined low-level strategies

```
io-entity-eval =  
  io-stream-wrap (  
    debug  
    ; ? (<id>, fout)   
    ; debug  
    ; parse-entity-stream  
    ; debug  
    ; entity-to-class  
    ; debug  
    ; <WriteToFile>  
    ("transformed.txt", <id>)  
  )
```

term wrap

Term project and wrap

?p [<s>]

is syntactic sugar for

{x: ?p[x]; <s> x}

!p [<s>]

is syntactic sugar for

{x: where (s => x); !p[x]}

Strategy library, data operators as strategy operators

- add,
- div,
- mul,
- subt
- nub
- union
- diff
- isect
- set-eq
- ...

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