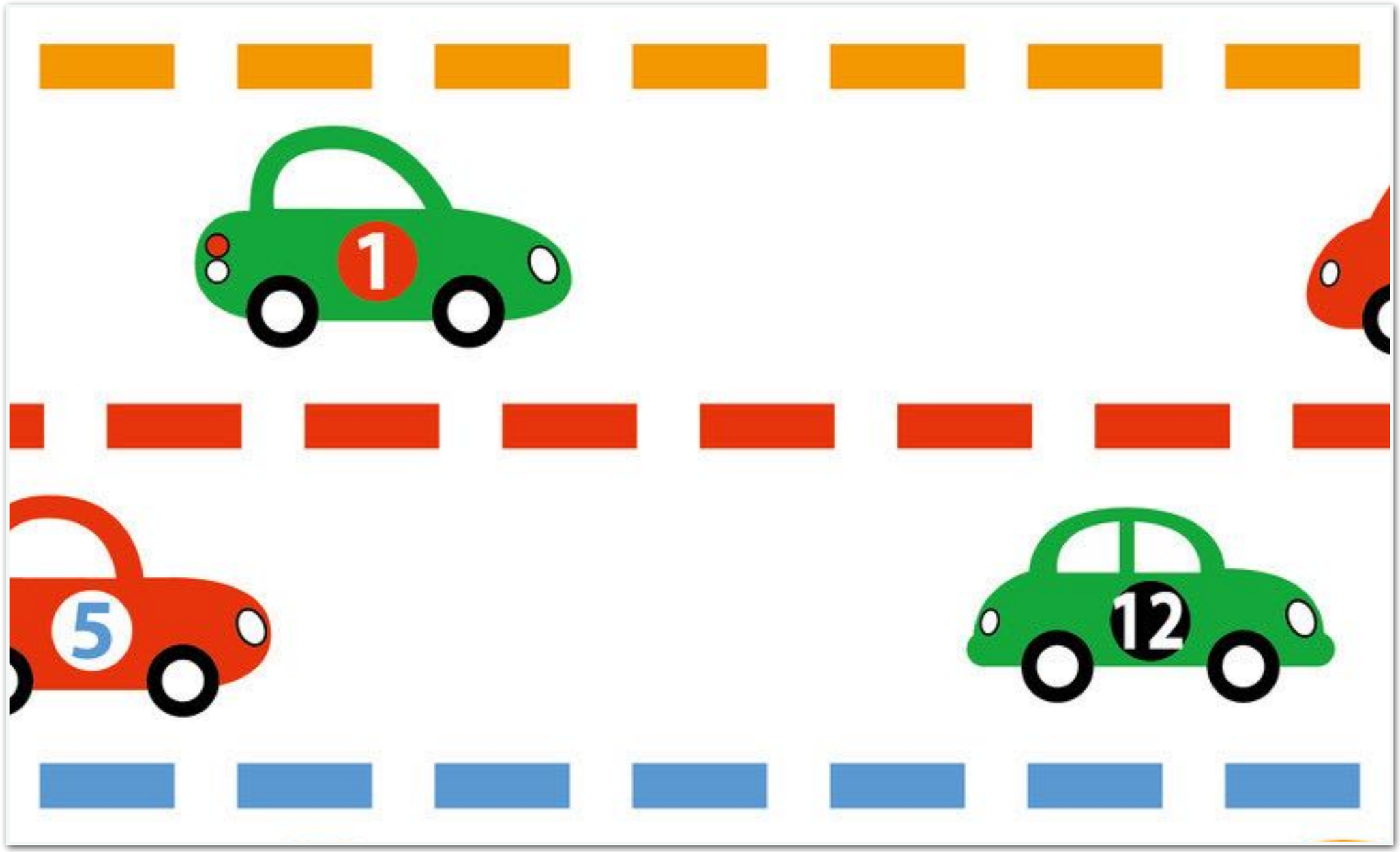
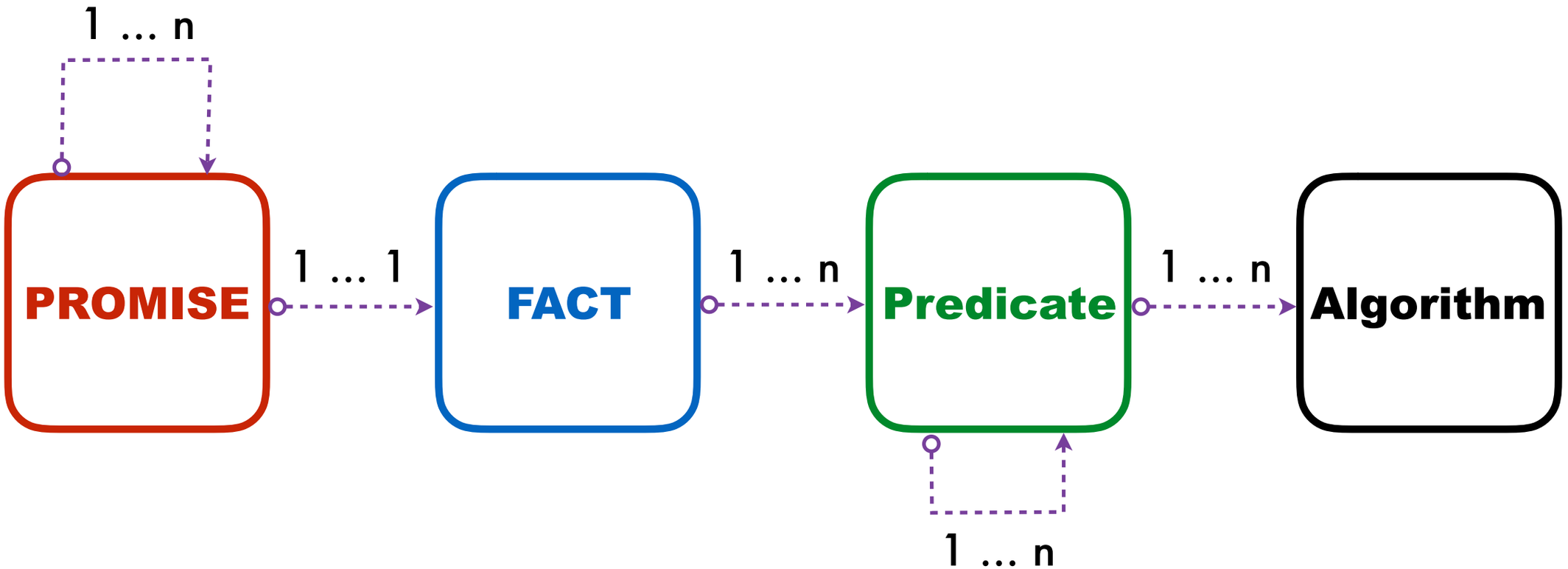
Thoughtworks



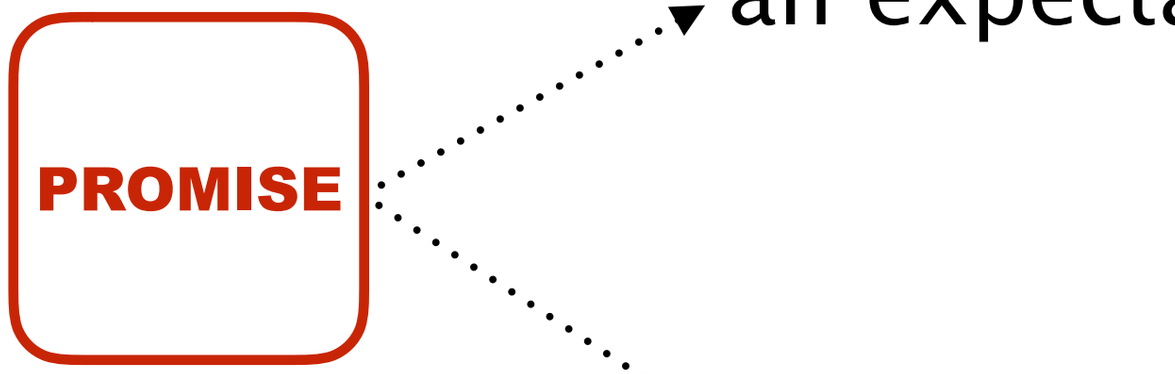
Promise based assertion framework

王博

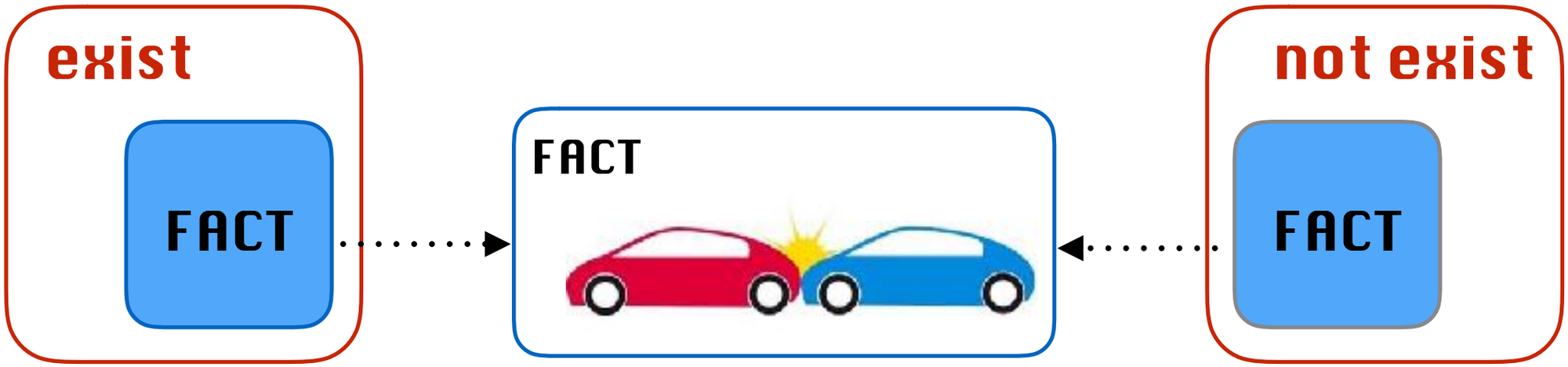
Conception



Promise



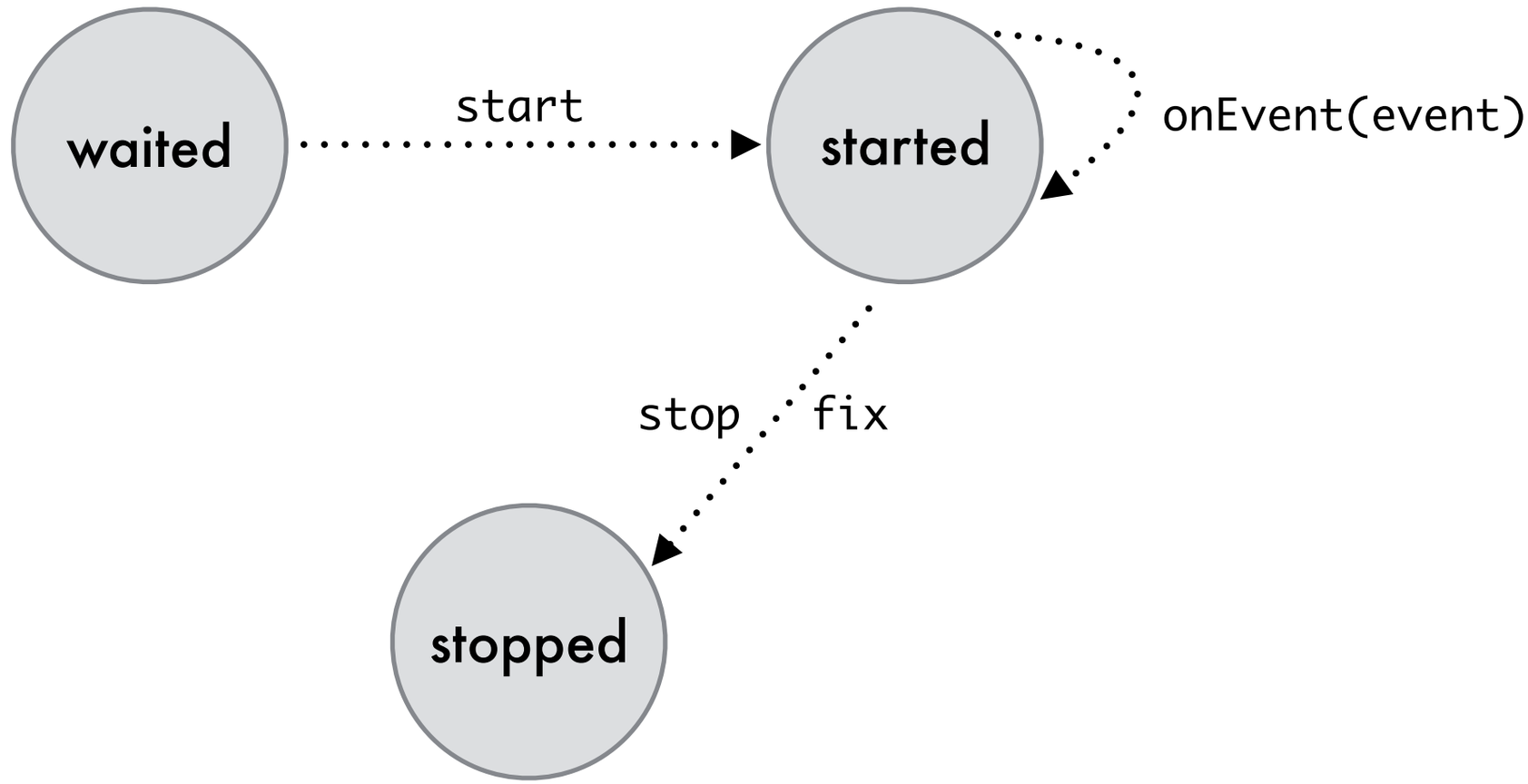
Promise : two basic type



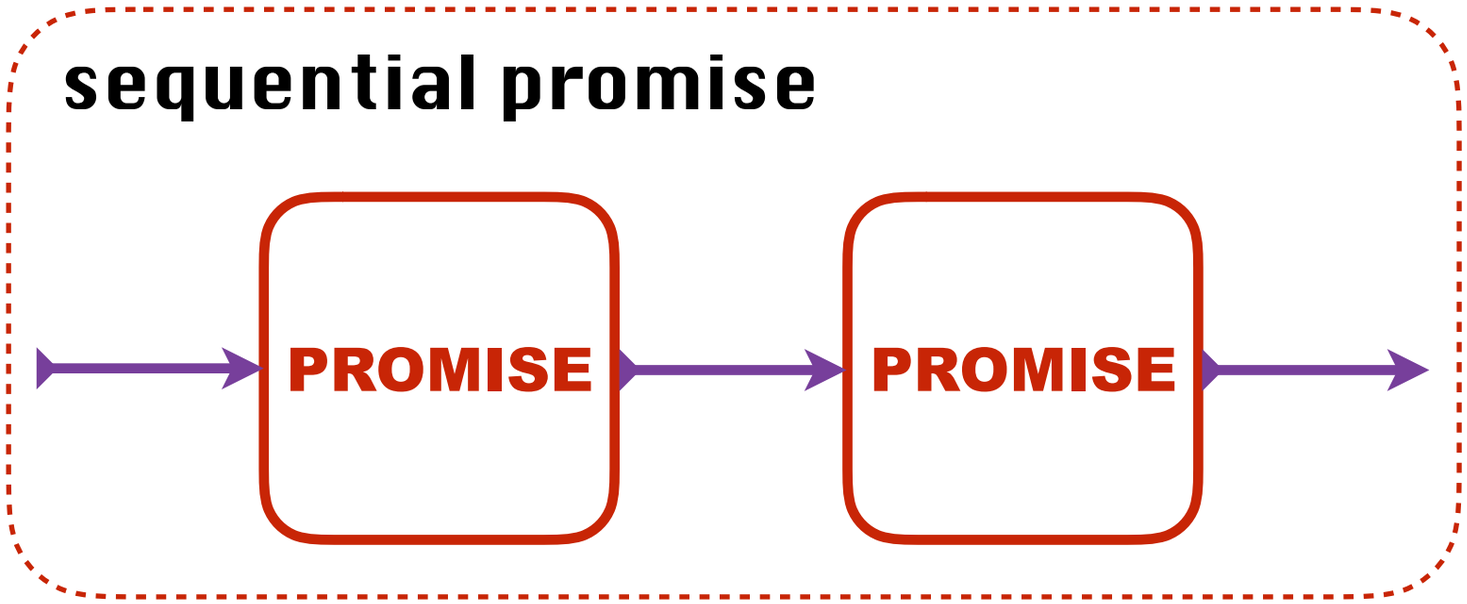
promise: exist collision

promise: not exist collision

Basic Promise : state

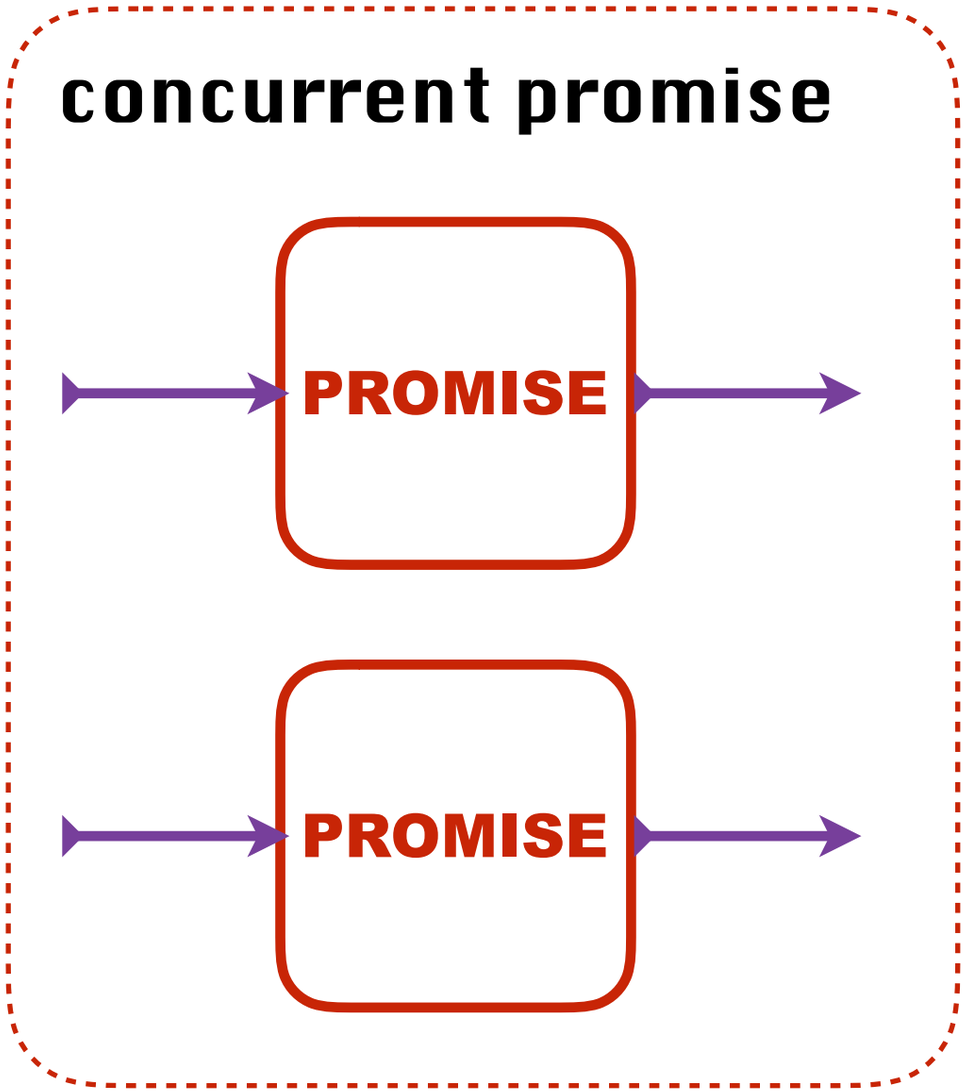


Promise : relationship



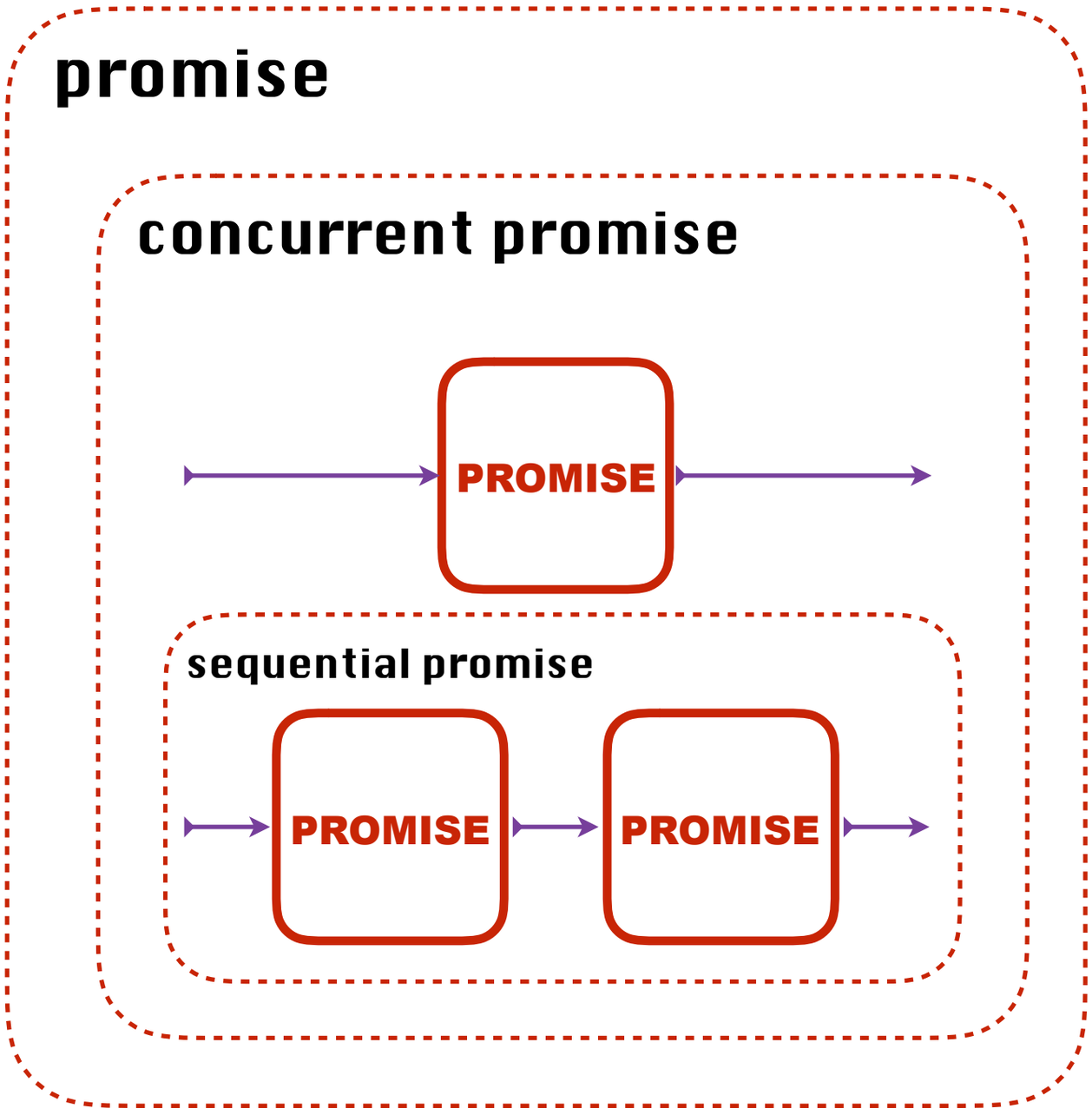
1. vehicle 0 is stop
2. distance of vehicle 0 and vehicle 1 is between 5m and 15m

Promise : relationship



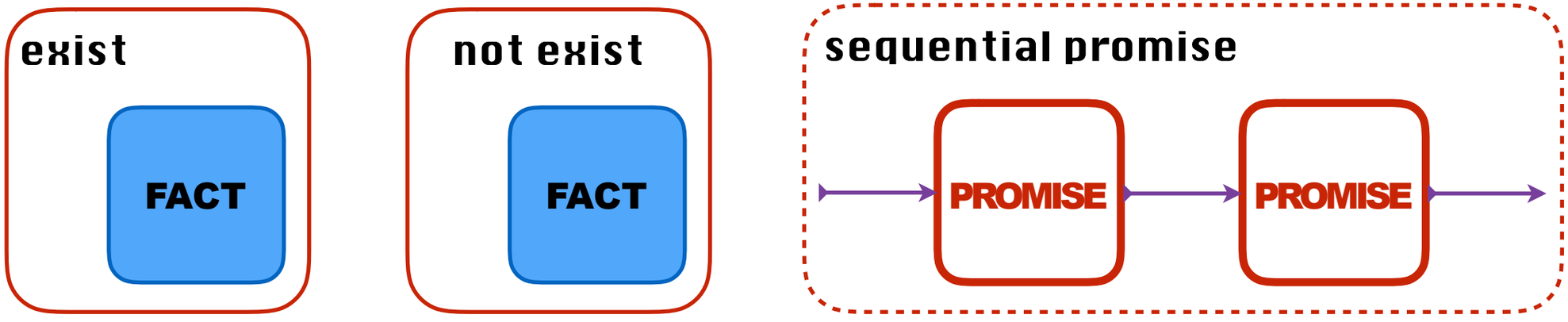
1. vehicle 0 is not collision
2. vehicle 0 is not stop

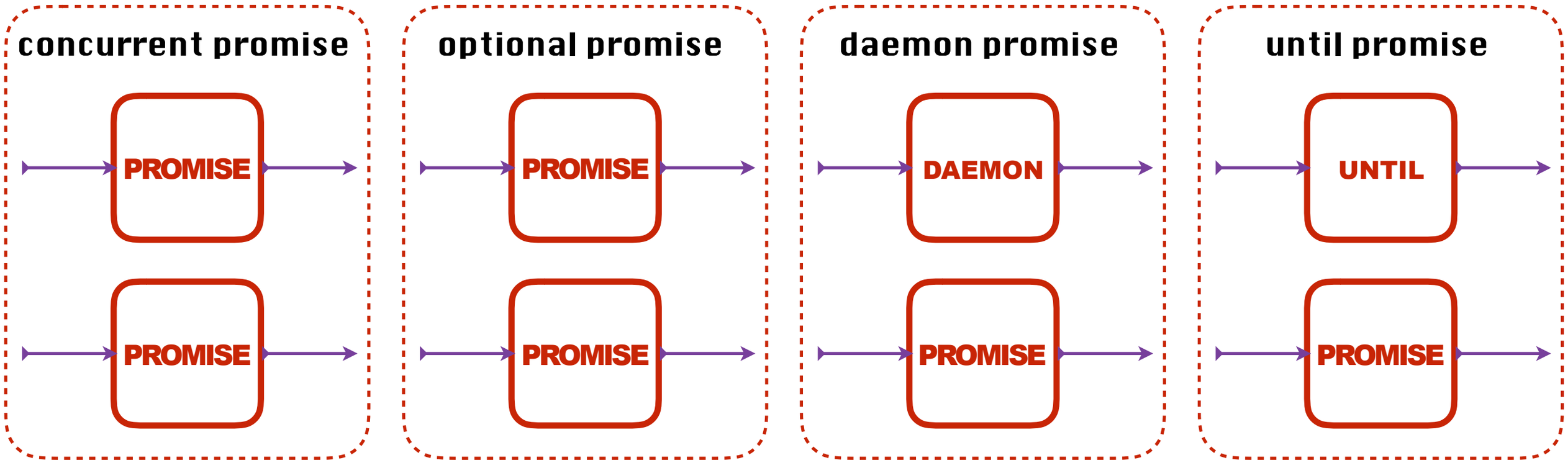
Promise : composite



1. vehicle 0 is not collision
2. vehicle 0 is stop
3. distance of vehicle 0 and vehicle 1 ...

Promise : all


exist
FACT
not exist
FACT
sequential promise
PROMISE
PROMISE


concurrent promise
PROMISE
PROMISE
optional promise
PROMISE
PROMISE
daemon promise
DAEMON
PROMISE
until promise
UNTIL
PROMISE

Promise : result

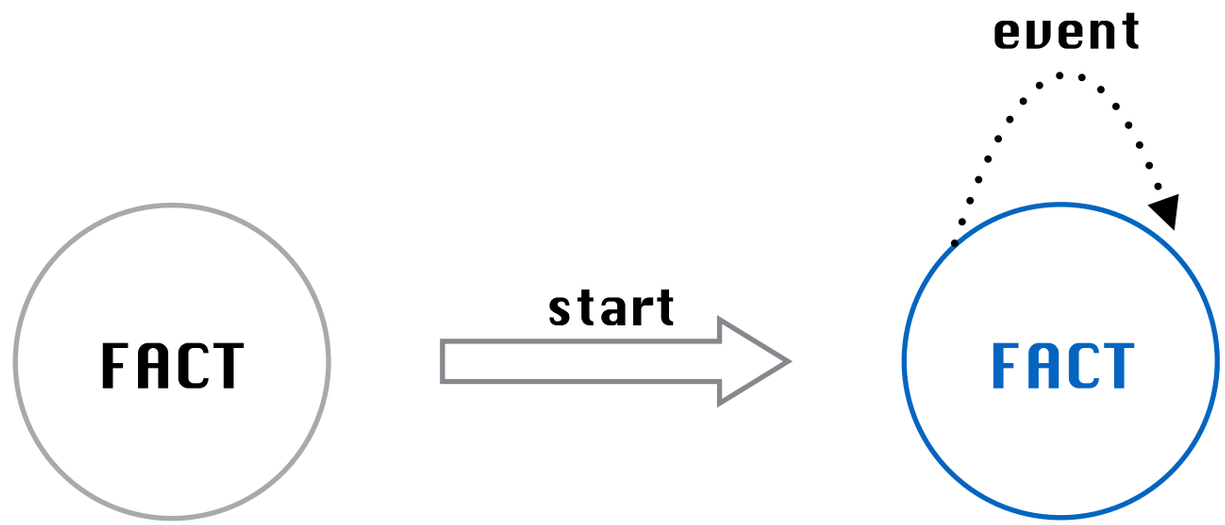
unknown

success

failed

fixed

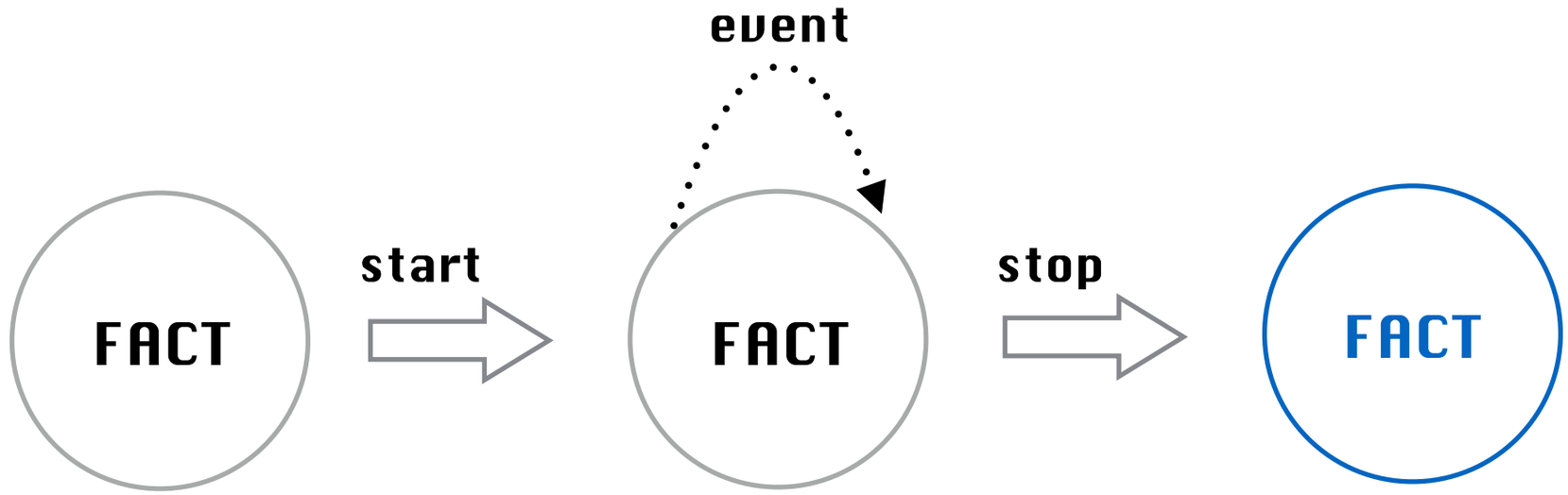
Fact



not occurred

occurred ?

Closure Fact



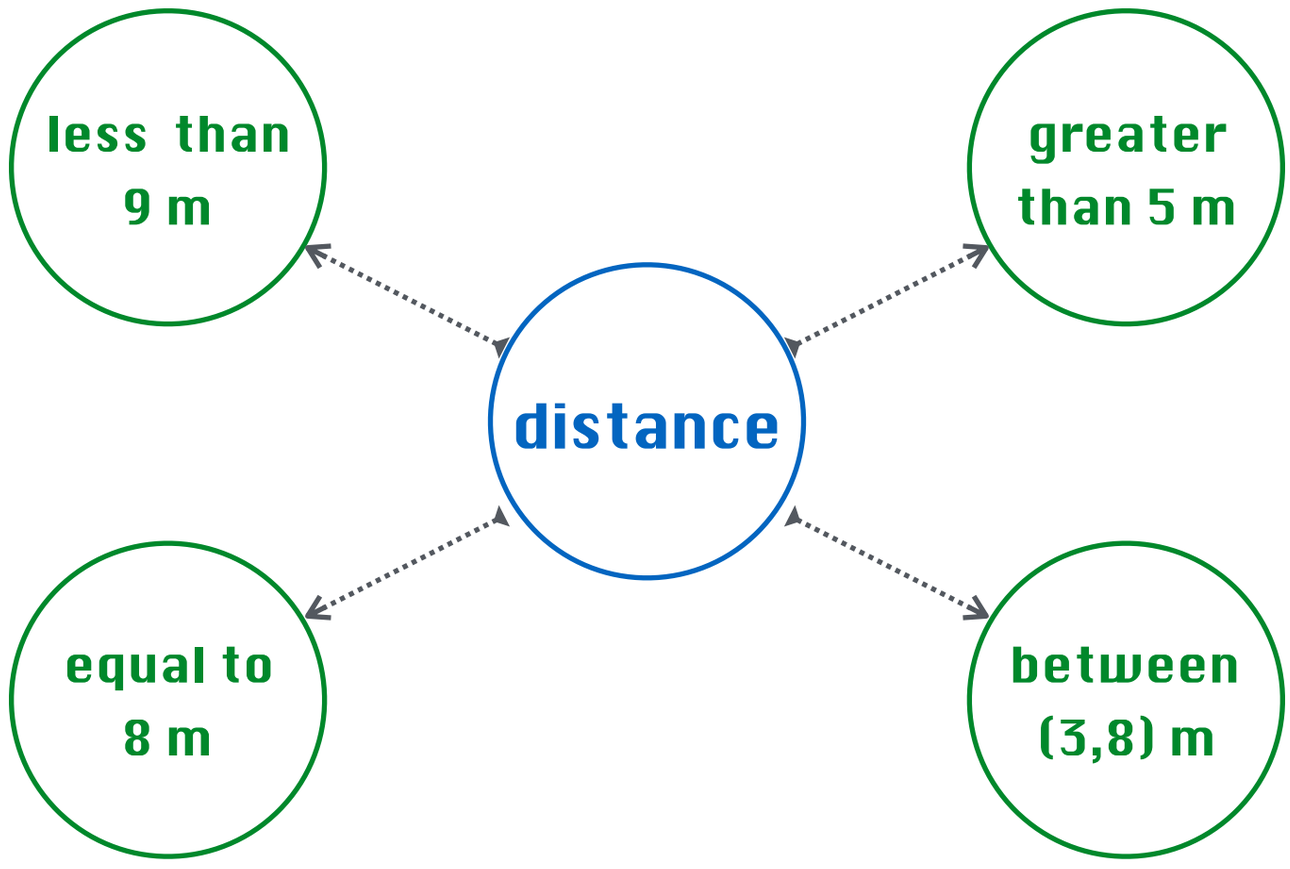
Fact without predicate

They simply present a state.

Fact with predicate

They often obtain value from event and environment.
After compose a predicate, then makes a fact.

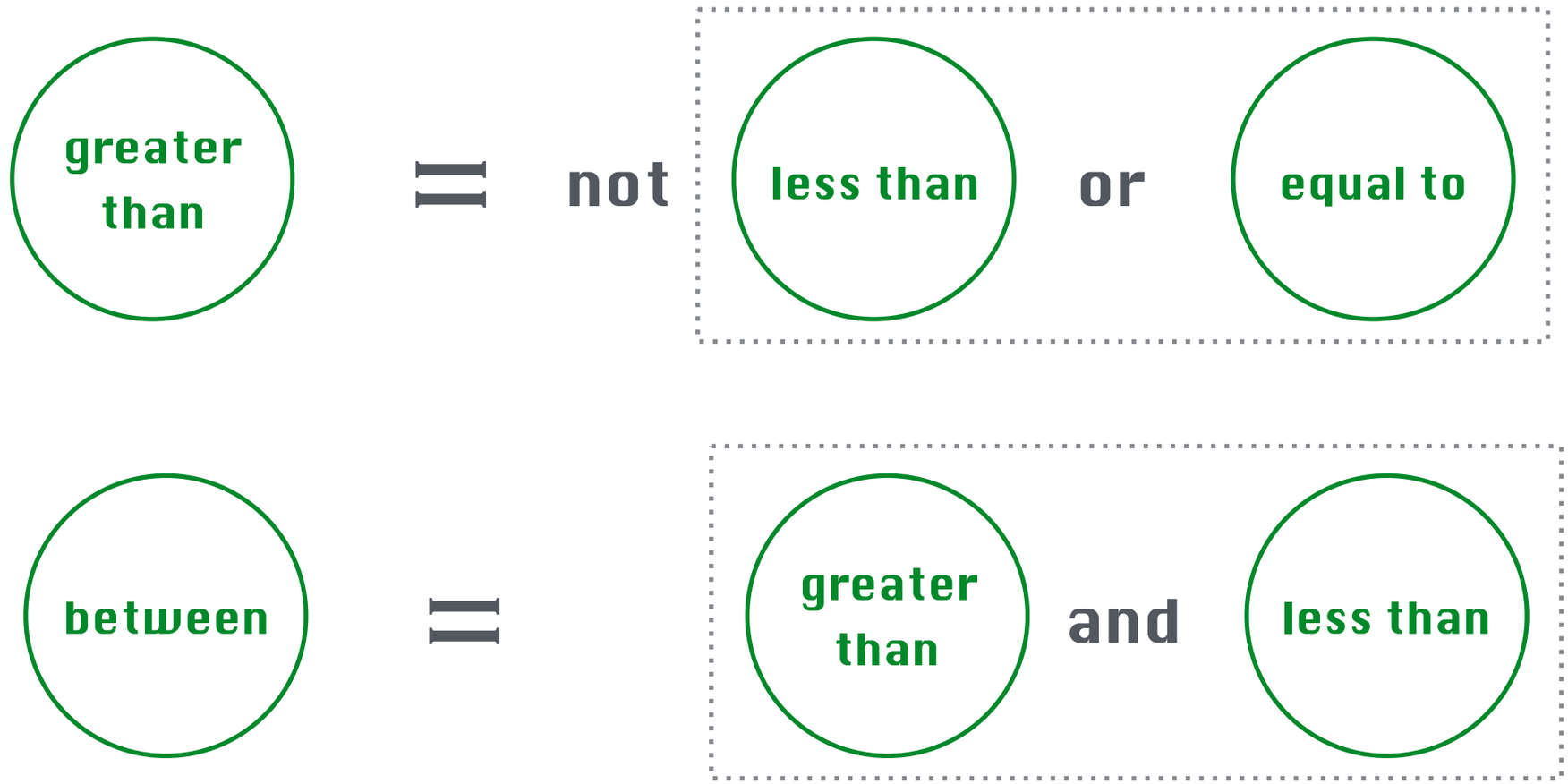
Fact with predicate



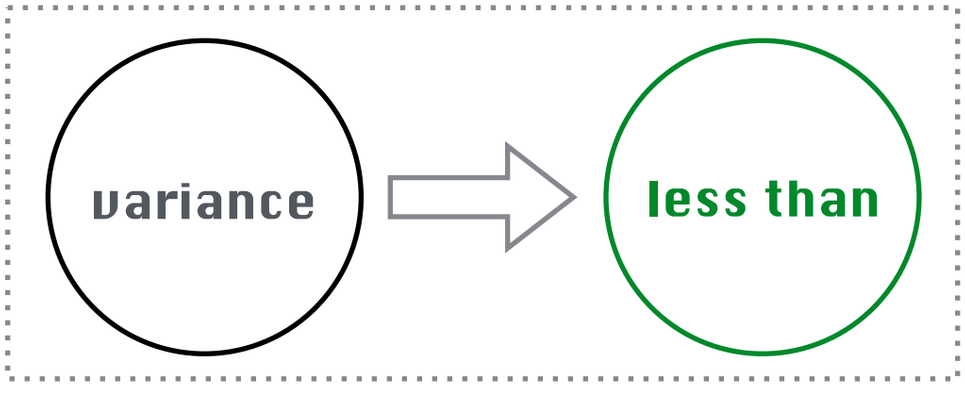
Predicate

```
BOOL PRED(CONST T& VALUE);
```

Predicate : conjunct



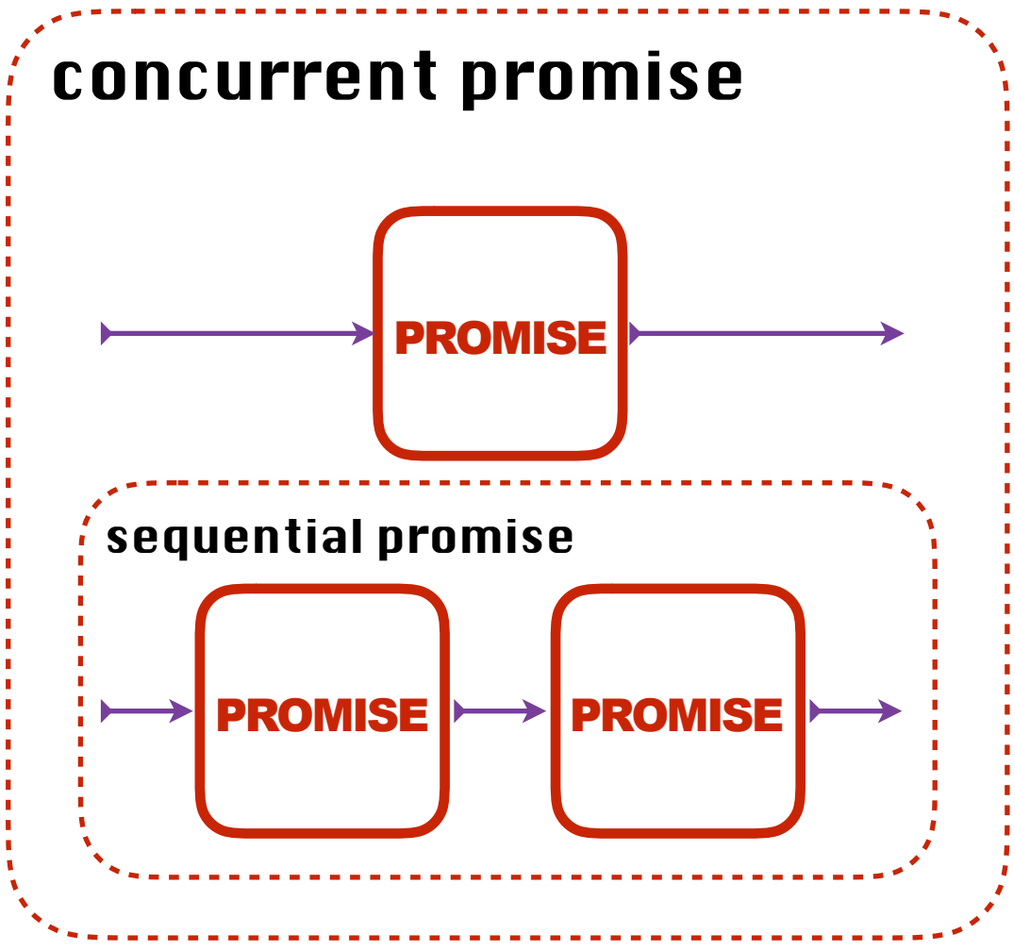
Predicate : compose with algorithm

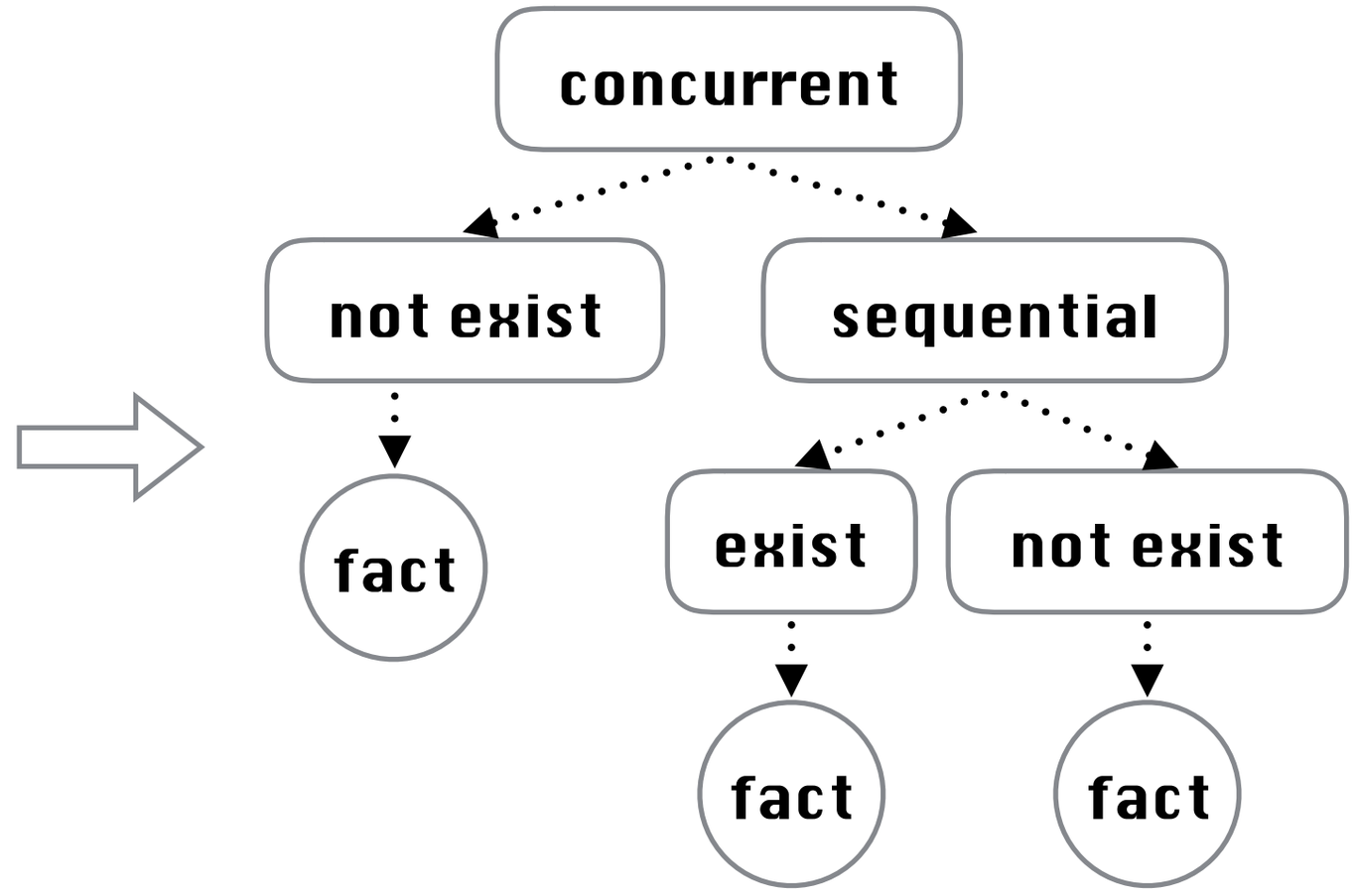


Algorithm

Execute a special calculation, could be composed and reused.

How to describe? DSL





Inner DSL : C++

```
auto promise = __con( __not_exist(__fact(Collision, 0))
                    , __seq( __exist(__fact(LaneChange, 0).predOf(EqualTo(1))
                           , __not_exist(__fact(LaneGap, 0).predOf(GreaterThan(1)))
                           )
                    );

simulation.evaluate(promise);
```

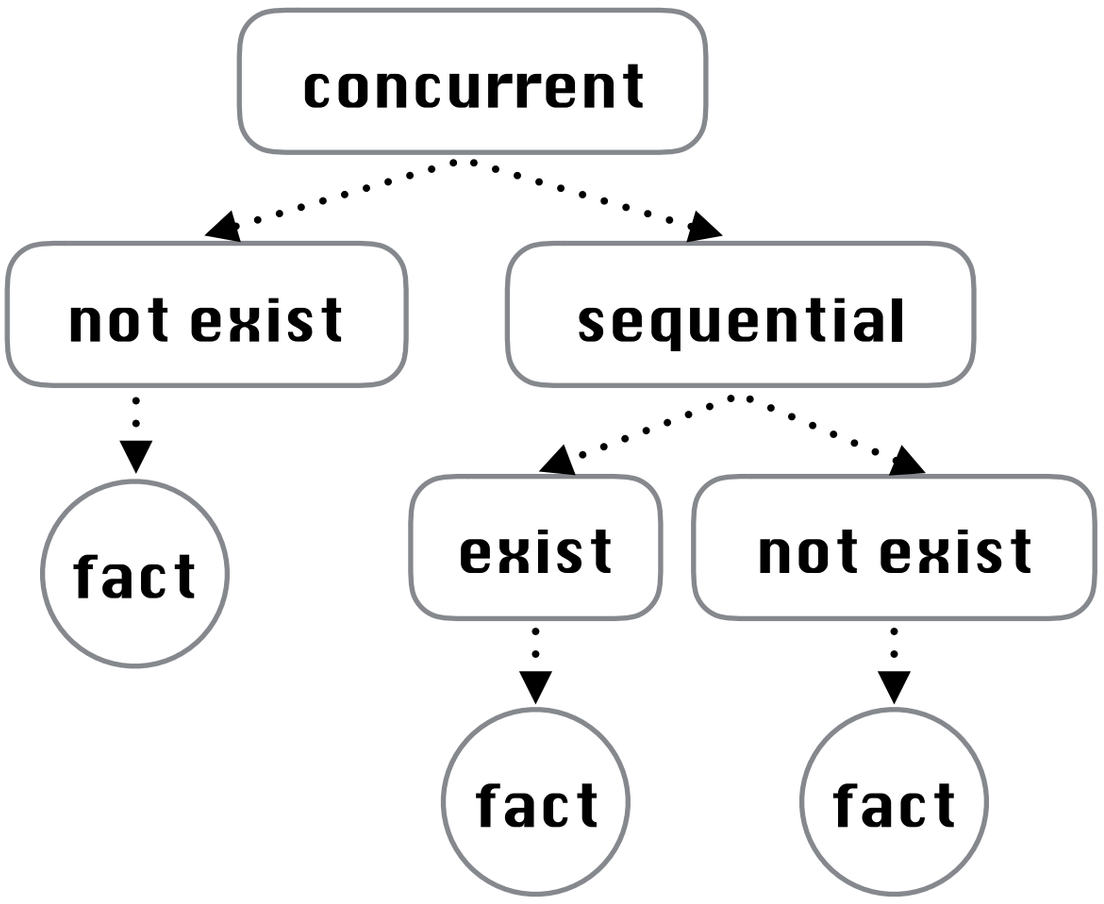
Outer DSL

Keep it simple ,

but not simplify!

```
fact     :   sfact
         |   pfact
         ;

pfact    : pfname 'predicate that' algo? pred ;

pfname   :  'duration'
         |  'lane change'
         |  'lane gap'
         |  'distance to vehicle ' INT
         ;

pred     : 'equal to' param
         | 'less than' param
         | 'greater than' param
         | 'between' param 'and' param
         ;

algo     : 'average'
         | 'variance'
         ;

sfact    : 'collision'
         | 'stop'
         ;

basepromise : ID                          # factId
            | '[' ID ']'                  # closureFactId
            | sfact                       # factName
            | '[' sfact ']'               # closureFactName
            ;

promise  :   promise '&&' promise         # con
         |   promise '||' promise         # opt
         |   promise '->' promise         # seq
         |   promise '-|' promise         # until
         |   promise '-<' promise         # daemon
         |   '!' basepromise              # notExist
         |   basepromise                  # exist
         |   '(' promise ')'              # parens
```

Outer DSL



Logic operation:

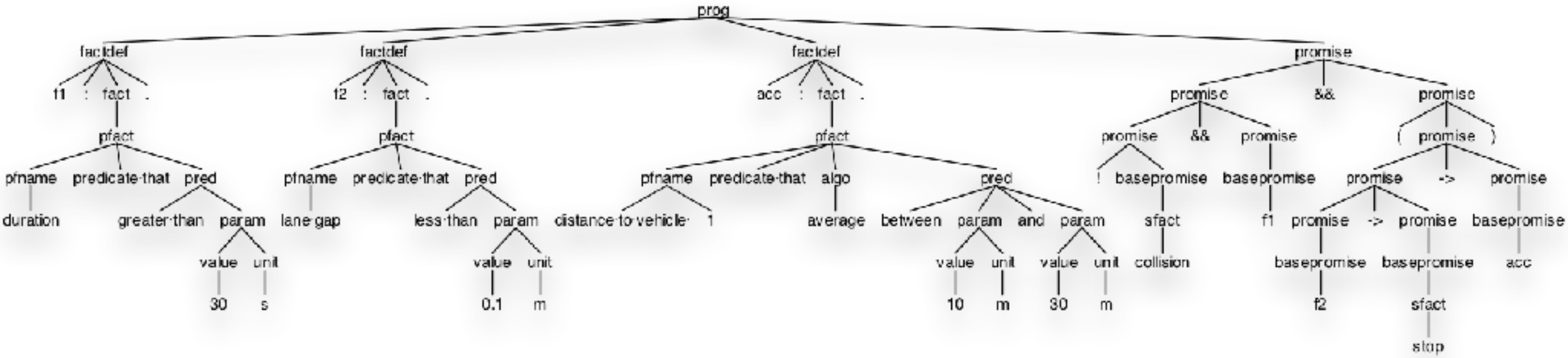
!	not exist
&&	concurrent
||	optional
-\>	sequential

Outer DSL

f1 : duration predicate that greater than 30 s.
f2 : lane gap predicate that less than 0.1 m.
acc : distance to vehicle 1 predicate that average between 10 m and 30 m.
promise : ! collision && f1 && (f2 -> stop -> acc)

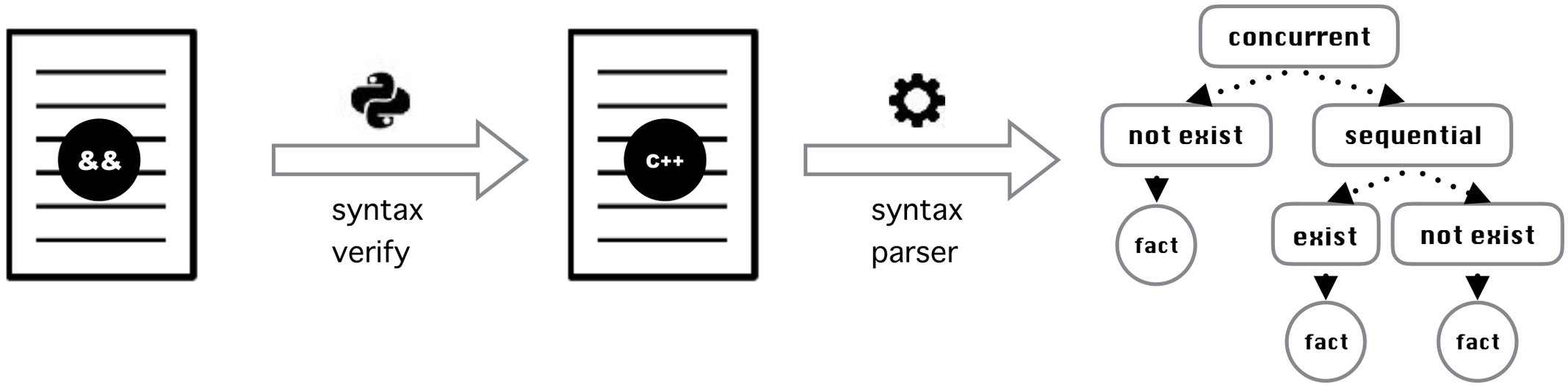
Describe fact, and define their relationship by simple symbols!

Outer DSL - syntax tree



Don't be scared! It just be used by program!

Outer DSL


&&
syntax
verify
C++
syntax
parser
concurrent
not exist
sequential
fact
exist
not exist
fact
fact

Definition of domain segment