Interpretation of natural language instructions

Translating sentences by using a grammar

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Outline

Introduction & problem description

- An alternative user interface
- Translation
- Delimitation
  - Intranet of a software development company
  - Customers, People and Projects exists
  - Limited amount of instructions

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Interface definition

Sufficient for novice users

```
people who know Java
```

Sufficient for expert users

```
people know java
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Sufficient for expert users

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Solution

- Precise translation
- Need mapping from natural language to query language
  - Use a grammar

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Translate by using a grammar

- Structured rules for strings
- Use logic to combine strings in one language
- Use the same logic to combine strings in another language
- Grammars have a long history within programming languages

How can we build a grammar to translate sentences?

We will use Grammatical Framework (GF)

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Introducing Grammatical Framework (GF)

- Development platform for natural languages
  - Open source functional programming language
  - Designed for creating natural language grammars
- Separates abstract and concrete syntax
  - Abstract syntax captures the *logic* of a sentence
  - Concrete syntax represents the logic as a string

Same technique used by programming languages

- Programmer writes source code in concrete syntax
- Compiler translates concrete syntax to abstract syntax
- The rest of the compiler manipulates the abstract syntax

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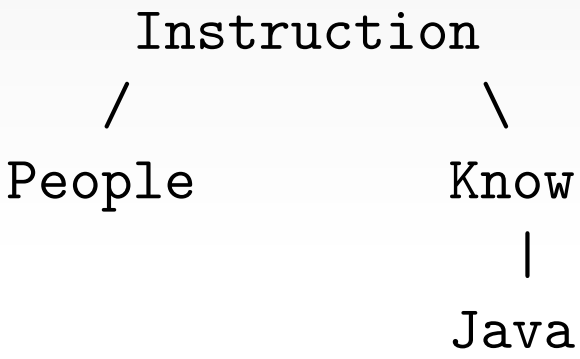
A simple example

Abstract syntax



Concrete syntaxes

```
people who know Java                                  -- English
personer som kan Java                                 -- Swedish
q=object_type : Person AND expertise : Java           -- Solr
```

A simple example

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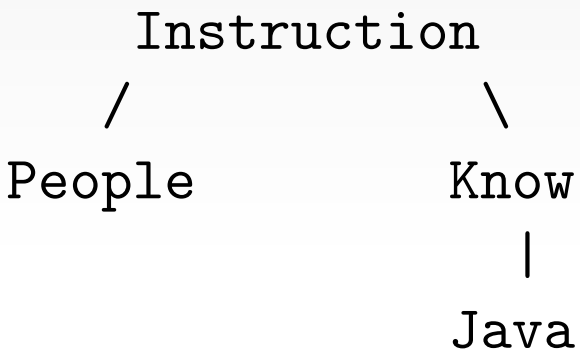

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GF implementation: Abstract syntax

```
abstract Instrucs = {
  cat
    Instruction
    Subject ;
    Relation ;
    Object ;
  fun
    MkInstruction : Subject -> Relation -> Instruction ;
    People : Subject ;
    Know : Object -> Relation ;
}
```

GF implementation: English concrete syntax

```
concrete InstrucsEng of Instrucs = {
  lincat
    Instruction = Str ;
    Subject = Str ;
    Relation = Str ;
    Object = Str ;
  lin
    MkInstruction subject relation =
                    subject ++ "who" ++ relation ;
    People = "people" ;
    Know object = "know" ++ object ;
    Java = "Java" ;
}
```

GF implementation: Solr concrete syntax

```
concrete InstrucsEng of Instrucs = {
  lincat
    Instruction = Str ;
    Subject = Str ;
    Relation = Str ;
    Object = Str ;
  lin
    MkInstruction subject relation =
                    "q=" ++ subject ++ "AND" ++ relation ;
    People = "object_type : Person" ;
    Know object = object = "expertise : " ++ object ;
    Java = "Java" ;
}
```

GF implementation: Translation

GF + Abstract syntax + Concrete syntax =

- Parser
- Linearizer
- Generator

GF implementation: Translation

GF + Abstract syntax + Concrete syntax =

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Results

foobar

Title

This is an example.