# Toward Knowledge Systems in Software Engineering

#### Knowledge of programming

- Objectives
  - to formulate ideas(abstract)
  - to modify the source code according to the idea
  - to verify the change meeting the idea
  - to make sure the change does not break other parts

#### Whole Picture

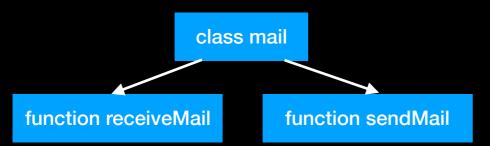
"send email when a requirement(scenario with natural language) task is ready" email feature set(hooks for requirement) metrics(function, robustness, reliability, complexity) function: email email-> (mail) set of mapping (send, mail) (receive, mail) semantic profile: profiles(semantic and syntax) (receive)->(mail)<-(send) class mail() { function receiveMail() declarations(hooks for source code) function sendMail() 1. class mail(){...} source code, excluding dead code 2. function receiveMail(){...} 3. function sendMail(){...}

## syntax and semantic profile

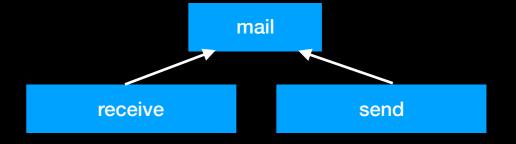
#### example:

```
class mail() {
    function receiveMail() {
        ...
    }
    function sendMail() {
        ...
    }
}
```

for this code, syntax profile is:



for this code, semantic profile is:



### Metrics and Implementing Profiles

- Metrics
  - function, robustness, reliability, complexity
- Profiles
  - source code, developer, bug
- Relationships between profiles and code section
  - source code -> semantic profile -> declaration -> code section
  - source code -> syntax profile -> declaration -> code section
  - developer -> commit history -> code piece -> semantic profile -> declaration -> code section
  - developer -> commit history -> code piece -> syntax profile -> declaration -> code section
  - bug -> code piece -> semantic profile -> declaration -> code section
  - bug -> natural language description -> syntax profile -> declaration -> code section

#### Metrics and Implementing Profiles

- Relationships between profiles and metrics
  - source code -> complexity and function
  - developer -> reliability
  - bug -> robustness

#### Previous

- Declaration -> code section
- Developer -> commit history -> code piece -> declaration

### TODO (zimeng)

- Mapping: function <-> semantic profile
- Discussion:
  - defining representations of semantic profiles (set, tree, graph)
  - implementing the mappings

#### TODO (zhenghui)

- Mapping: function <-> syntax profile
- Discussion:
  - defining representations of syntax profiles (graph)
  - the representation only considers high-level modules, like function, class...
  - considering how to work with zimeng's part, like introducing the distance among modules
  - implementing the mappings