The EMFeR Solution to the

TTC 2018 Software Mapping Case

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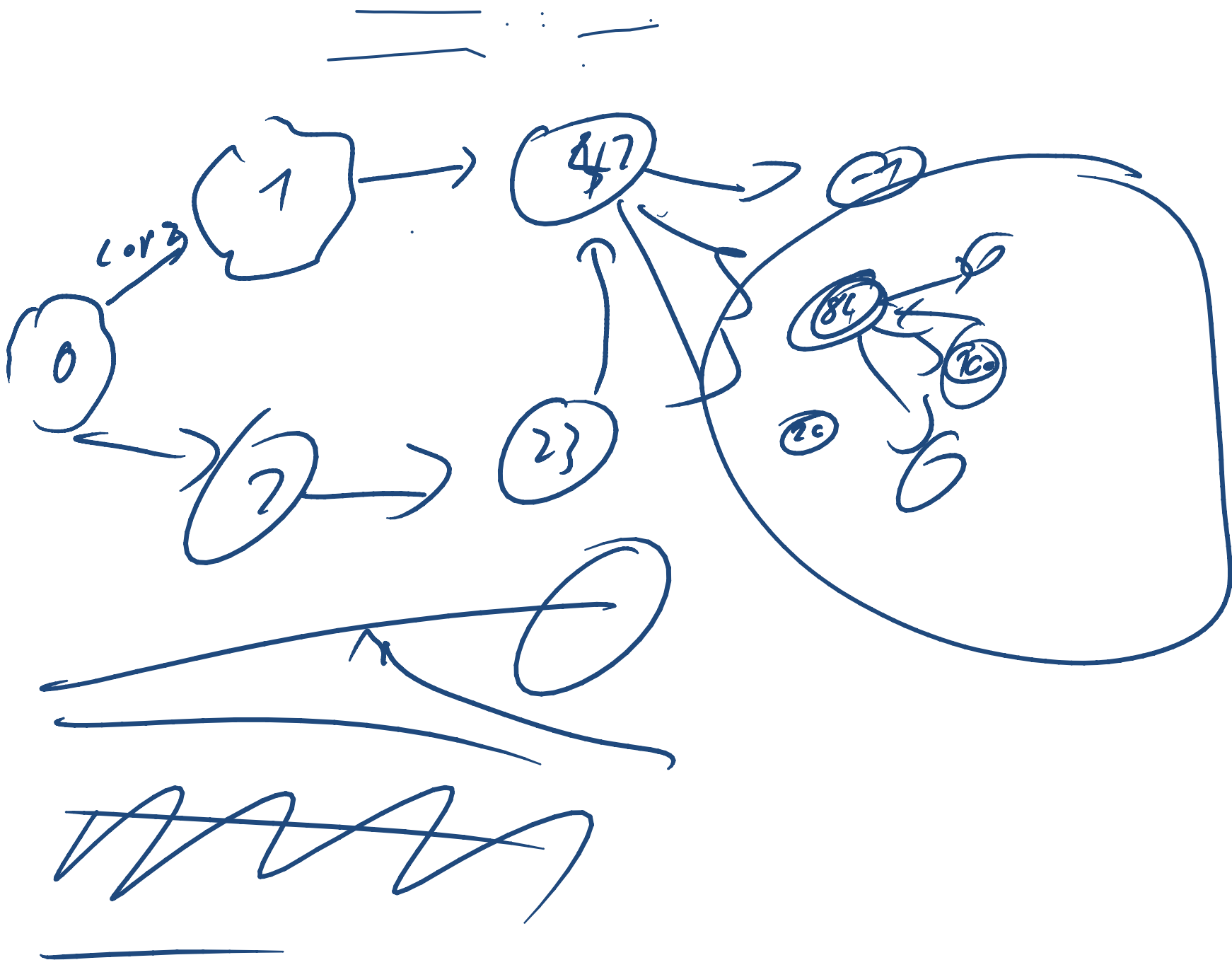
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NOT Dresden AST: EMFeR classes

```
package uniks.ttc18
class ESolution {
        refers EAssignment[] assignments
}
class EAssignment {
        String requestName
        String compName
        String implName
        String nodeName
        refers EAssignment[] assignments
}
class EChoice {
        refers EAssignment assignment
        String resName
}
```

```java
public Solution solve(Root model) throws SolvingException {

    EMFeRTrafos emFeRTrafos = new EMFeRTrafos(model);

    ESolution initialSolution = Ttc18Factory.eINSTANCE.createESolution();

    emFeRTrafos.createTopLevelAssignments(initialSolution);

    EMFeR emfer = new EMFeR().withStart(initialSolution)

        .withMetric(solution -> emFeRTrafos.getNumberOfSolvedIssues(solution))

        .withTrafo("choose implementation",

            solution -> emFeRTrafos.getImplementationChoices(solution),

            (solution, choice) -> emFeRTrafos.applyImplementationChoice(solution, choice))

        .withTrafo("assign node",

            solution -> emFeRTrafos.getComputeNodeChoices(solution),

            (solution, choice) -> emFeRTrafos.assignComputeNode(solution, choice));

    int noOfStates = emfer.explore();
```

```java
Solution bestSolution = emFeRTrafos.getDummySolution();
  double bestObjective = Double.MAX_VALUE;
  for (ReachableState state : emfer.getReachabilityGraph().getStates()) {
    ESolution newSolution = (ESolution) state.getRoot();
    Solution emferSolution = emFeRTrafos.transformPartial(newSolution);
    if ( ! emferSolution.isValid()) {   continue; }
    double newObjective = emferSolution.computeObjective();
    if (newObjective < bestObjective) {
      bestSolution = emferSolution;
      bestObjective = newObjective;
    }
  }
  return bestSolution;
}
```

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Benchmark	Simple time ms	Solution objective	EMFeR time ms	objective	ILPDirect time ms	objective
0_trivial	3	226823.67	542	226823.67	139	226823.67
1_small	5	34620.20	57	34620.20	38	34620.20
2_small-many-hw	10	34620.20	99	34620.20	124	34620.20
3_small-complex-sw	10	-	163,158	-	1062	34620.20
4_medium	120,002	-	101,525	-	124,367	5467973.79
5_medium-many-hw	120,002	-	101,525	-	111,427	-

Models serve a purpose:

- ○ An AST is practical for parsing

- ○ An AST does not suite business logic