11-791: Design and Engineering of Intelligent Information Systems

Homework #3 – Lars Mahler – lmahler@andrew.cmu.edu

Execution Architecture with CPE and Deployment Architecture with UIMA-AS

Task 1.1 - 2.2

In implementing this assignment, I used the homework 2 files as a starting point. The "design" for this task was fairly simple:

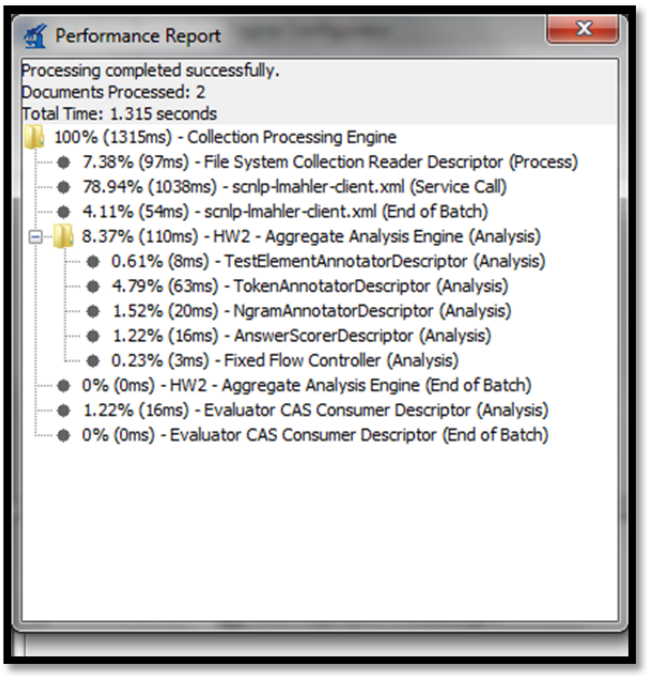
- I created a CPE descriptor (**hw3-lmahler-CPE.xml**), and set up the CPE as follows:
  - **Collection Reader**: uses the org.apache.uima.tools.components.FileSystemCollectionReader (with a descriptor: resources\descriptors\FileSystemCollectionReader.xml)
  - **Input Directory**: it looks in the resources\inputData folder for documents
  - **Analysis Engines**: it includes two engines:
    - **scnlp-lmahler-client.xml**: a client descriptor that calls the remote UIMA-AS service (Stanford CoreNLP) to get NamedEntityMention annotations (and other annotations)
    - **hw2-lmahler-aae.xml**: an AAE descriptor for the AAE from homework 2. I made several modifications to the pipeline:
      - Removed the Evaluator component from the AAE, and turned it into a Cas Consumer (per the instructions in task 1.2).
      - I updated the AnswerScorer component so that it incorporates NamedEntityMention annotations (from the Stanford CoreNLP module) into the final score.
  - **Cas Consumers**: just includes one consumer:
    - The **Evaluator** component (that used to be part of the hw2-lmahler-aae.xml pipeline).

These changes successfully turned an AAE into a CPE that incorporated remote services. I compared the accuracy and speed of this new pipeline vs. the pipeline from homework 2:

- **HW2 Pipeline**
  - **Speed**: 0.2 seconds
  - **Accuracy**:
    - First document – Precision at 4: 0.50
    - Second document – Precision at 3: 0.67
    - Average precision (per document) - 0.585
- **HW3 CPE – Task 2.2**
  - **Speed**: 1.3 seconds (most of the time spent on the service call to Stanford)
  - **Accuracy**:
    - First document – Precision at 4: 0.50

- Second document – Precision at 3: 1.00
- Average precision (per document) - 0.75

HW3 – Task 2.2 Performance



Task 2.3

Task 2.3 was much harder. Conceptually, it should have been easy, however I encountered numerous issues trying to get the deploy script to recognize the correct classpath. The resulting "design" for this task was as follows:

- I created a deployment descriptor (**hw3-lmahler-aae-deploy.xml**).
  - This deploys the modified HW2 pipeline described above (**hw2-lmahler-aae.xml**).
  - It creates an endpoint called "QuestionAnsweringQueue".
- I then deployed the service to my machine, using startBroker.bat to start the broker, and deployAsyncService.bat to deploy the service
- I created a client descriptor (**hw3-lmahler-aae-client.xml**) that calls the deployed service.
- Finally, I created a CPE descriptor (**hw3-lmahler-aae-as-CPE.xml**), and set up the CPE as follows:
  - **Collection Reader**: uses the org.apache.uima.tools.components.FileSystemCollectionReader (with a descriptor: resources\descriptors\FileSystemCollectionReader.xml)
  - **Input Directory**: it looks in the resources\inputData folder for documents
  - **Analysis Engines**: it includes two engines:
    - **scnlp-lmahler-client.xml**: the same client descriptor used in the CPE above. This calls the remote UIMA-AS service (Stanford CoreNLP) to get NamedEntityMention annotations (and other annotations)
    - **hw2-lmahler-aae-client.xml**: the client descriptor that calls the (local) deployed service.

- **Cas Consumers**: just includes one consumer:
  - The **Evaluator** component (that used to be part of the hw2-lmahler-aae.xml pipeline).

I then compared performance against task 2.2. The new pipeline took slightly longer, reflecting the fact that it was gathering annotations from multiple (distributed) locations – on my computer, and on the mu.lti server:

- **HW3 CPE – Task 2.3**
  - **Speed**: 1.9 seconds (most of the time spent on the service call to Stanford)
  - **Accuracy**:
    - First document – Precision at 4: 0.50
    - Second document – Precision at 3: 1.00
    - Average precision (per document) - 0.75

HW3 – Task 2.3 Performance