Information Retrieval Exercises

Assignment 1:

IMDB Spider and Queries

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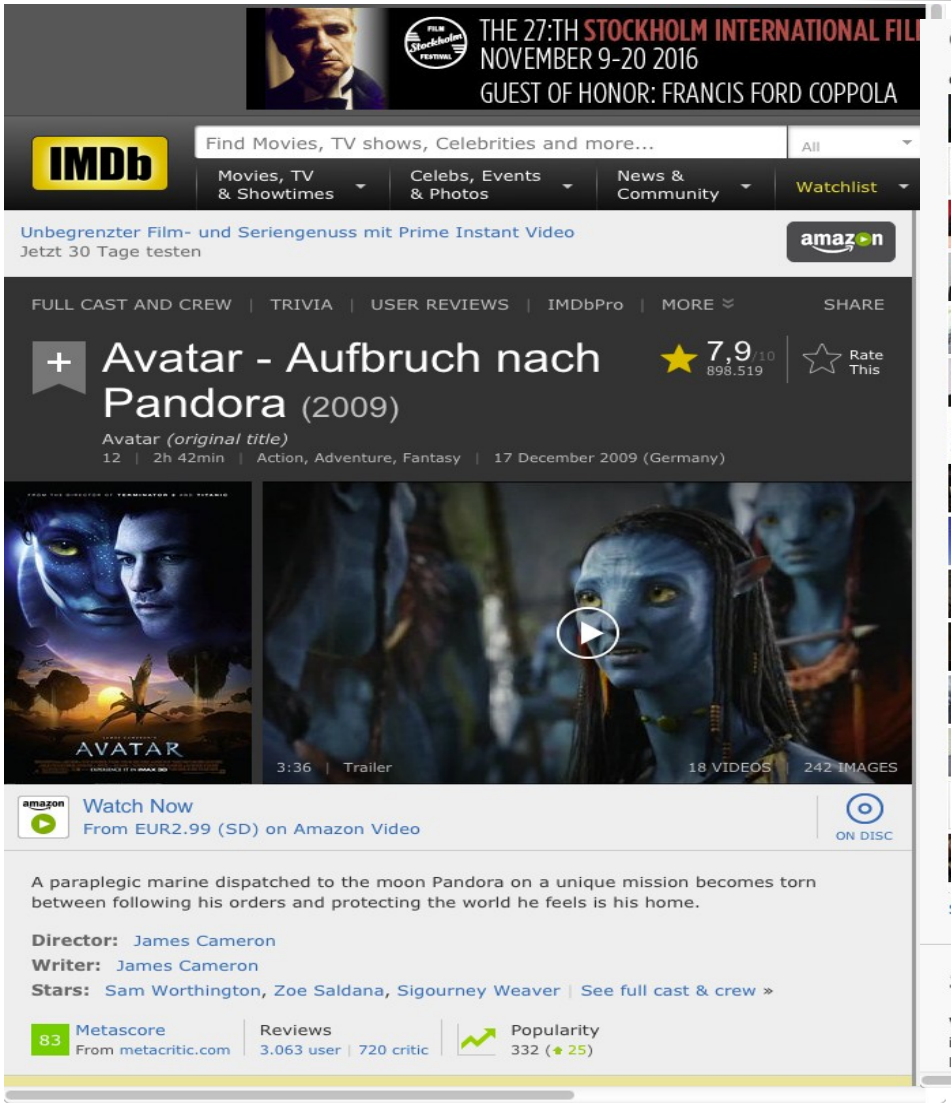
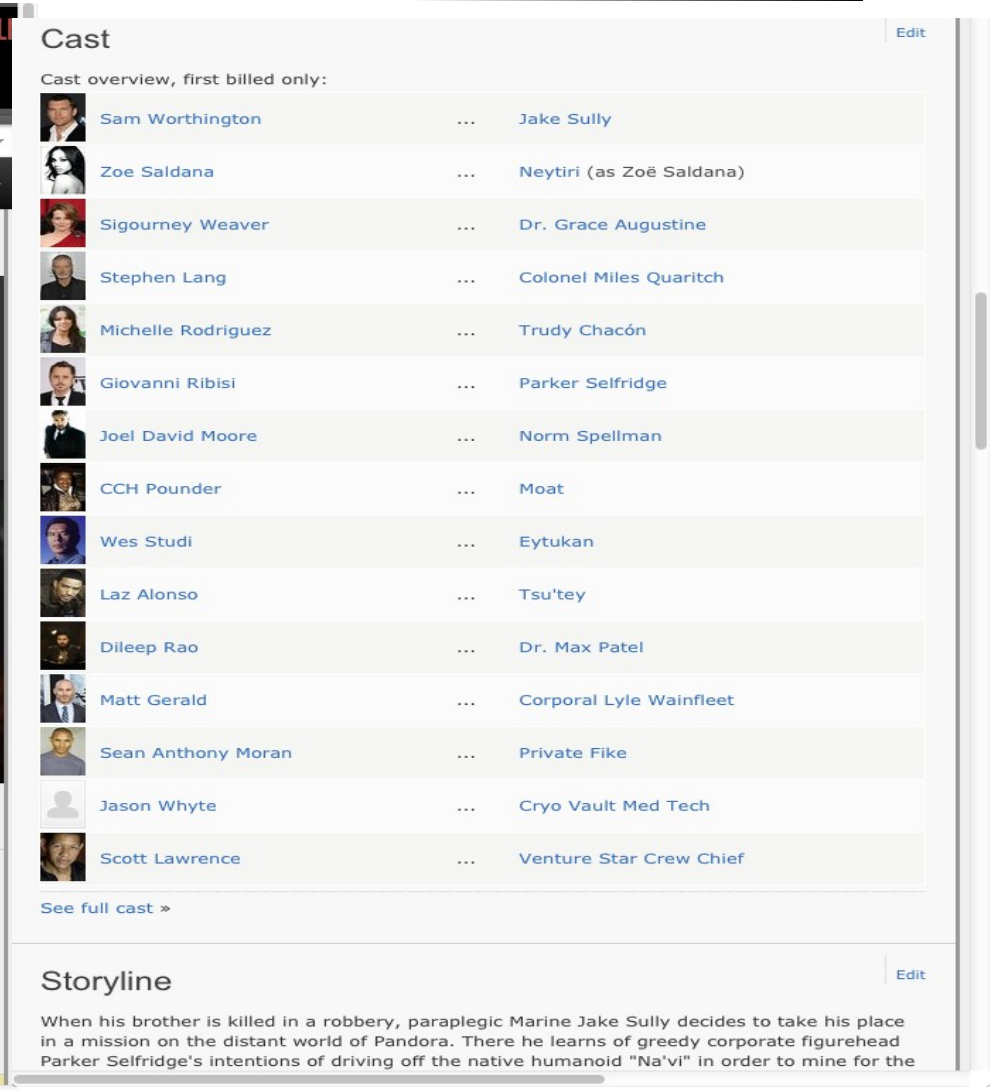
IMDB: Internet Movie Database





Assignment

- Task:
  - Given a list of 500 movie names, answer queries on such movies information
- Problem:
  - IMDB data is human-readable and semi-structured
- Pipeline:
  - “Scraping” data from IMDB, i.e.:
    - extracting data in structured format
  - Implementation of a Spider (a.k.a Web Crawler)
  - Perform queries on the scrapped data

Concrete tasks

1. Implement a JAVA program that reads a list of 500 movie titles from a JSON file

2. For each movie title, perform a web search on IMDB and retrieve movie's URL

3. For each movie, extract metadata (e.g. actors, plot, budget, description) from the movie's URL and store them in a JSON file

4. Implement specific queries on the data extracted

1. Read movie titles from JSON file

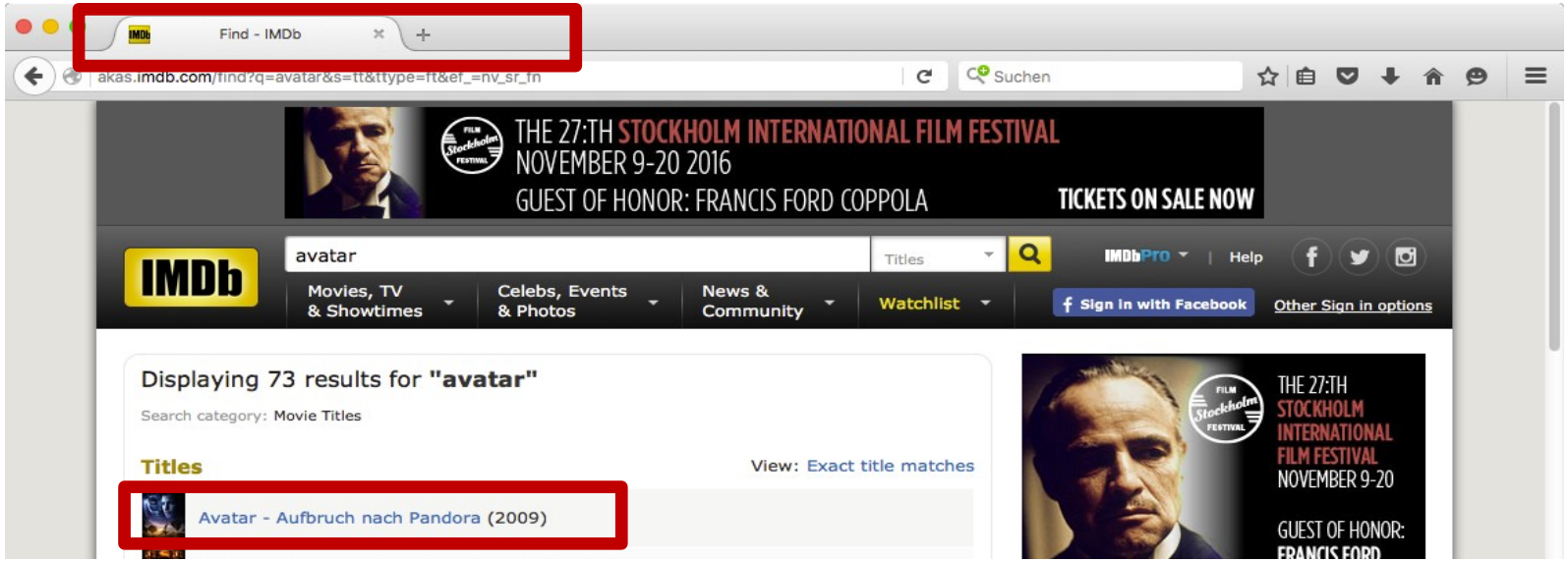
- Read movie titles from a JSON file “movies.json”:

```
[
   {"movie_name":"Avatar"},
   {"movie_name":"Star Wars VII: The Force Awakens"},
   ...
]
```

- You can use any Java library for parsing JSON files
  - Reference implementation: Oracle’s JSONP (https://jsonp.java.net/)
  - JSON.simple (https://github.com/fangyidong/json-simple)
  - GSON (https://github.com/google/gson)
  - Jackson Project (https://github.com/FasterXML/jackson)

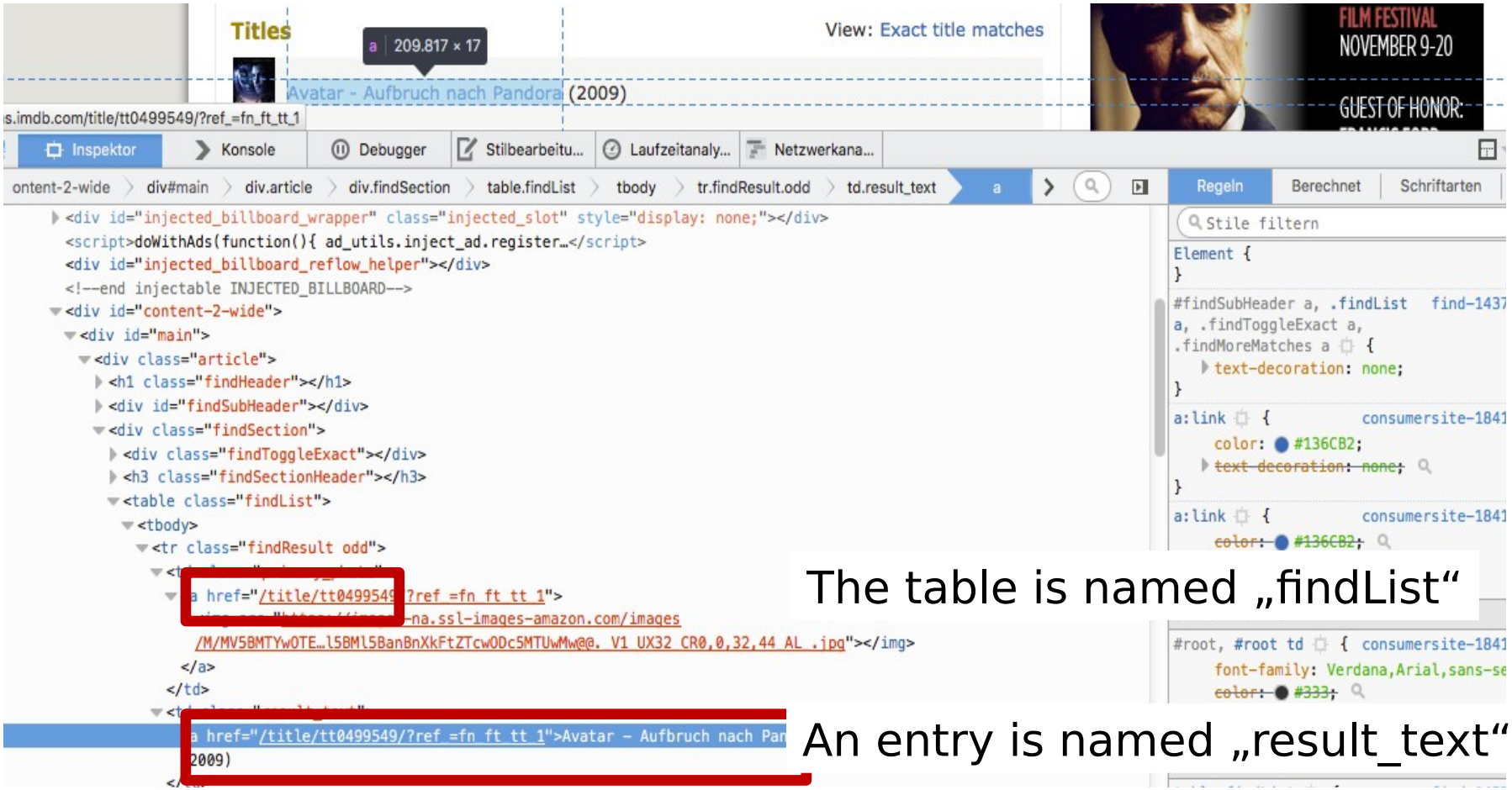
2. IMDB Spider: getting the URL

- *The Spider IMDBSpider.java should open the* URL:
  - *https://www.imdb.com/find?q=<MOVIE>&s=tt&ttype=ft*
  - Where <MOVIE> is the movie name in the JSON file
- From the results, extract the first element and its URL
- Use URL encoding of movie titles

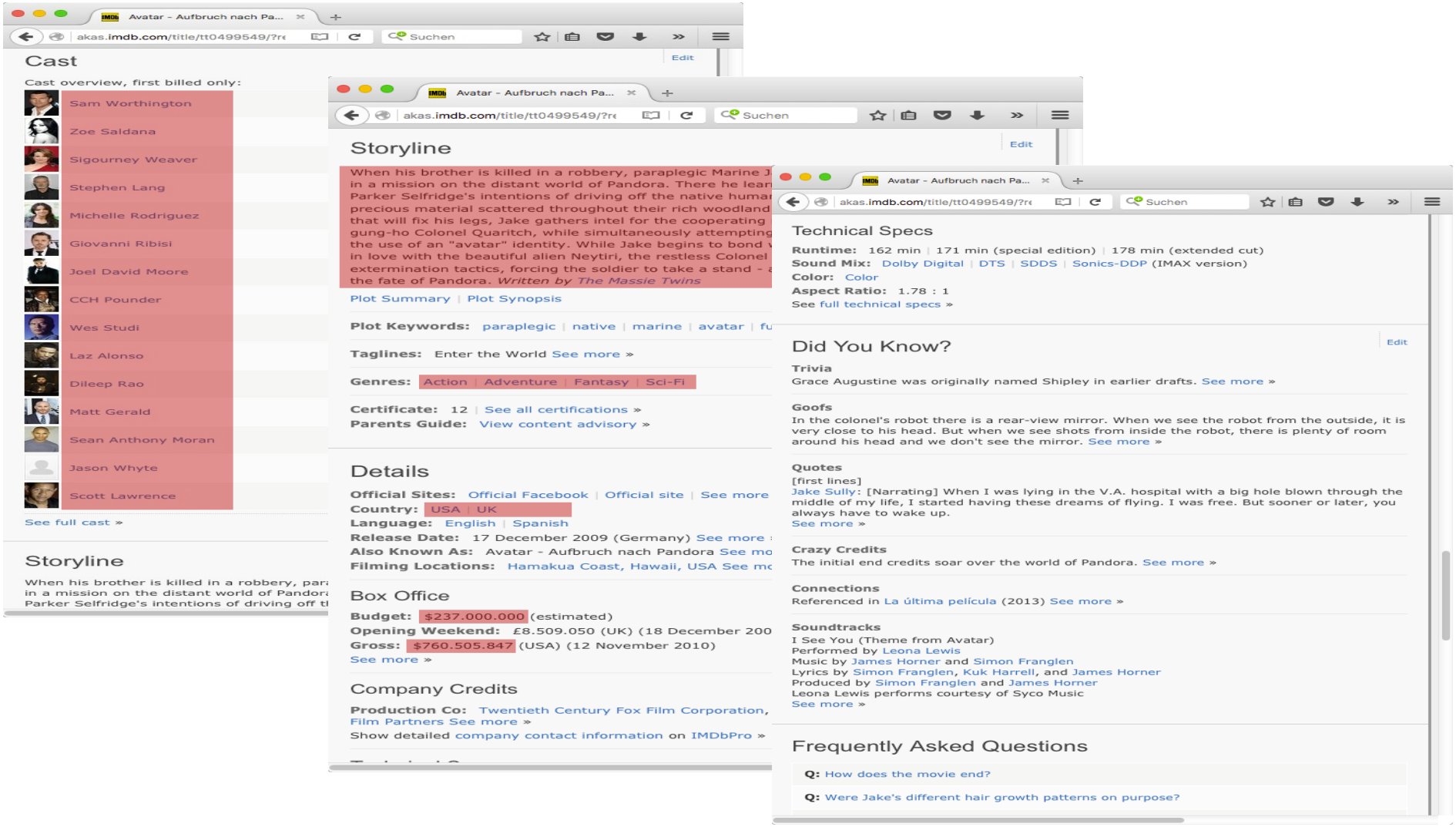


2. IMDB Spider: extracting movie url

- You have to parse the HTML file to extract the URL



3. Extract metadata from movie's URL



3. Extract metadata from Movie's URL

For each movie extract the following fields and store data into a JSON file:

- url
- title
- year
- genreList
- countryList
- directorList
- characterList
- description
- budget
- gross
- ratingValue
- ratingCount
- duration
- castList

- Each attribute is:
  - A string, as url,title,year
  - A JSON list: *List
- **Use exactly these names when storing into the JSON file**!
- For an example output refer to *avatar.json*

3. Extract metadata from Movie's URL

- Sometimes one or more field can be missing:
  - Use empty strings or empty arrays!

- Special case "gross"
  - First search for "Cumulative Worldwide Gross"
  - If missing, search for "Gross USA"
  - Only use dollar values (no Yen, Euros, etc)!

Optional: extract further meta information:

- keywordList,
- aspectRatio
- contentRating
- reviews
- critics

3. Extract metadata from Movie's URL

- XPATH is a syntax for navigating parts of an XML document:
- Has a directory-path-like syntax
  - ```
    <table class="list" >
       <tr>
          <td class="result">Avatar</td>
       </tr>
    </table>
    ```
  - **`/table[@class='list']//td[@class='result']/text()` → Avatar**
- In Java:
  - Htmlcleaner (http://htmlcleaner.sourceforge.net/)
  - Xsoup (https://github.com/code4craft/xsoup)
  - javax.xml.xpath.XPath
    ```

4. Query the corpus

- Mandatory queries:
  - You have to correctly implement **at least**:
    - **three** basic queries
    - **two** hard queries

- Custom queries:
  - Come up with a fancy custom query
  - Give a text description of the query, the implementation and the result
  - Very creative queries can earn an extra point for the competition

4. Easy Queries I

1. All-rounder:
   - all movies in which the director stars as an actor (cast)
   - top ten matches sorted by decreasing IMDB rating.
2. Under the radar:
   - the top ten US-American movies until (including) 2015 that have made the biggest **loss** despite an IMDB score above (excluding) 8.0, based on at least 1,000 votes.
   - **loss** = gross - budget.
3. The pillars of storytelling:
   - all movies that contain both (sub-)strings "kill" and "love" in their lowercase description (String.toLowerCase()).
   - Sort the results by the number of appearances of these strings and return the top ten matches.

4. Easy Queries II

4. The red planet:
   - Sci-Fi movies that mention "Mars" in their description (case sensitive!)
   - List all found movies in ascending order of publication (year)
5. Colossal failure:
   - all USA movies with:
     - a duration beyond 2 hours
     - a budget >=1 million
     - IMDB rating below 5.0
   - Sort results by ascending IMDB rating

4. Harder Queries (Aggregation & Join) I

1. Uncreative writers:
    - ten most frequent character names of all times ordered by frequency of occurrence
    - Filter any name containing "himself", "doctor", and "herself" from the result
2. Workhorse:
    - top ten most active actors (cast), i.e., those actors which have starred in most movies (descending order)
3. Must see:
    - best rated movie of each year starting from 1990 until (including) 2010 with more than 10,000 ratings.
    - from oldest to most recent

4. Harder Queries (Aggregation & Join) II

4. Rotten Tomatoes:

   - worst rated movie of each year starting from 1990 till (including) 2010 with an IMCB score larger than 0.

   - from oldest to most recent

5. Magic Couples:

   - Determine those couples that feature together in the most movies (e.g. Adam Sandler and Allen Covert feature together in multiple movies)

   - top 10 couples and sort the result by the number of movies


ENOUGH BLABLA!!
JUST SHOW ME THE CODE!!
imgflip.com

The code: IMDBSpider

```
public class IMDBSpider {
      public IMDBSpider() {
      }
*/
public void fetchIMDBMovies(String movieListJSON, String outputDir) throws IOException {
    // TODO add code here
}

  public static void main(String[] argv) throws IOException {
      String moviesPath = "./data/movies.json";
      String outputDir = "./data";

      if (argv.length == 2) {
          moviesPath = argv[0];
          outputDir = argv[1];

      } else if (argv.length != 0) {
          System.out.println("Call with: IMDBSpider.jar <moviesPath> <outputDir>");
          System.exit(0);
      }

      IMDBSpider sp = new IMDBSpider();
      sp.fetchIMDBMovies(moviesPath, outputDir);
  }
}
```

DO NOT MODIFY!

EXACTLY 2 ARGUMNETS:
- MOVIES NAMES
- OUTPUT DIR

The code: IMDBQueries

```
public class IMDBQueries {

    protected List<Tuple<Movie, String>> queryAllRounder(List<Movie> movies) {
        // TODO Basic Query: insert code here
        return new ArrayList<>();
    }

public static void main(String[] argv) throws IOException {
    String moviesPath = "./data/movies/";

    if (argv.length == 1) {
        moviesPath = argv[0];
    } else if (argv.length != 0) {
        System.out.println("Call with: IMDBQueries.jar <moviesPath>");
        System.exit(0);
    }

    MovieReader movieReader = new MovieReader();
    List<Movie> movies = movieReader.readMoviesFrom(Paths.get(moviesPath));

    System.out.println("All-rounder");
    {
        IMDBQueries queries = new IMDBQueries();
        long time = System.currentTimeMillis();
        List<Tuple<Movie, String>> result = queries.queryAllRounder(movies);
        System.out.println("Time:" + (System.currentTimeMillis() - time));

        if (result != null && !result.isEmpty() && result.size() == 10) {
            for (Tuple<Movie, String> tuple : result) {
                System.out.println("\t" + tuple.first.getRatingValue() + "\t"
                    + tuple.first.getTitle() + "\t" + tuple.second);
            }
        } else {
            System.out.println("Error? Or not implemented?");
        }
    }
    System.out.println("");
```

class Movie already provided (do not modify!)

DO NOT MODIFY THIS

EXACTLY ONE ARGUMENT: MOVIES DIR

class MovieReader provided (do not modify!)

Caveats

- Crawler:
  - *IMDBSpider.java*, which reads the movie titles from a JSON file and stores each movie in a single JSON file

- Queries:
  - You must implement five queries in *IMDBQueries.java*
  - Optional Custom Query: You can implement one fancy custom query. Give a description of the query, source code and the result.
  - **A query counts as implemented if it is correct**. So, implement more than five to be sure to complete the task!
  - No query result caching!

Competition

- Queries should not only be correct but as fast as possible
- While you have 500 movies - I will execute your queries with 2500 movies
- Evaluation:
  - A correctly implemented query
  - Bonus for faster implementation

Submission

- Java source codes and **two executable JARs**
  - java -jar IMDBSpider.jar movies.json <moviesDir>
  - java -jar IMDBQueries.jar <moviesDir>

Submission

- Before submitting, make sure that you:
  - did not alter the functions‘ signatures (types of parameters, return values)
  - only use the default constructor and don‘t change its parameters
  - did not change the class or package name
  - named your jars “IMDBSpider.jar” and “IMDBQueries.jar”
  - tested your jar (on a gruenau)

Submission

- Submission**:**
  - **Tuesday, 04.05., 23:59 (midnight)**
  - **Wednesday, 05.05., 23:59 (midnight)**

- Presentation:
  - Tuesday, 11.05.
  - Wednesday, 12.05

Next week (attendance optional)

- Q/A session for assignment 1
- “Live” coding? Scraper example
- If you have questions about topics from the lecture, write me an email in advance!

Questions?