Efficient Route Planning
SS 2011

Lecture 5, Friday June 10th, 2011
(Web application, Google Maps API, ...)

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Overview of this lecture

- **Feedback from the exercises**

  – Your experiences & your experimental results

  – Information about the final **exam** on Monday, August 15

- **A route planner web application**

  – Your next exercise:

    - build a web application, based on Google Maps

    - where you can specify source and target location

    - and the application will show the shortest path

    - computed by a server running your algorithms

  – To this end, we will learn something today about

    - Google Maps API, HTML, DOM, CSS, JavaScript, jQuery, AJAX, JSON, JSONP, sockets, …

Feedback for Exercise Sheet **2** (Landmarks)

■ Summary / excerpts

– Less work than exercise sheet 1

– A lot of work spent on refactoring code from ES1

– Proofs were ok

– More feedback on the code would be nice   [ok]

– Master solutions would be nice   [done]

– Problems with Ant + JUnit   [solved by now]

– Clear guidelines missing on how to deal with: isolated nodes, multiple connected components, ...

Feedback for Exercise Sheet **3** (Arc flags)

■ Summary / excerpts

– Took quite a lot of time, some say too much for 1 week

– Parts of the algorithm's description too vague

– Complete and correct solution to exercise sheet 1 was an essential prerequisite

– Too much programming of trivial things, costs a lot of time but little learning effect

Experimental results from Ex. Sheet 3

- **See the table on the Wiki**

    – Many results still missing, please put them there!

    – The results which are there are quite conclusive:

    - Arc flags **much** faster then Dijkstra and the two A* heuristics we have seen so far

    - For Saarland and 1000 regions, up to **100** times faster!

    - But half an hour of precomputation

    - Let's look at some typical search spaces ...

Final exam

- **Some information**

  - Will take place on **Monday**, **August 15**, **2011**

  - It will most probably be a written exam

    - 2 – 2 ½ hours, starting at 2:00 pm, here in HS 026

    - 4 – 5 tasks, 30 minutes each

  - Unless only ≤ 10 of you want to take the exam

    - then I will make it an oral exam
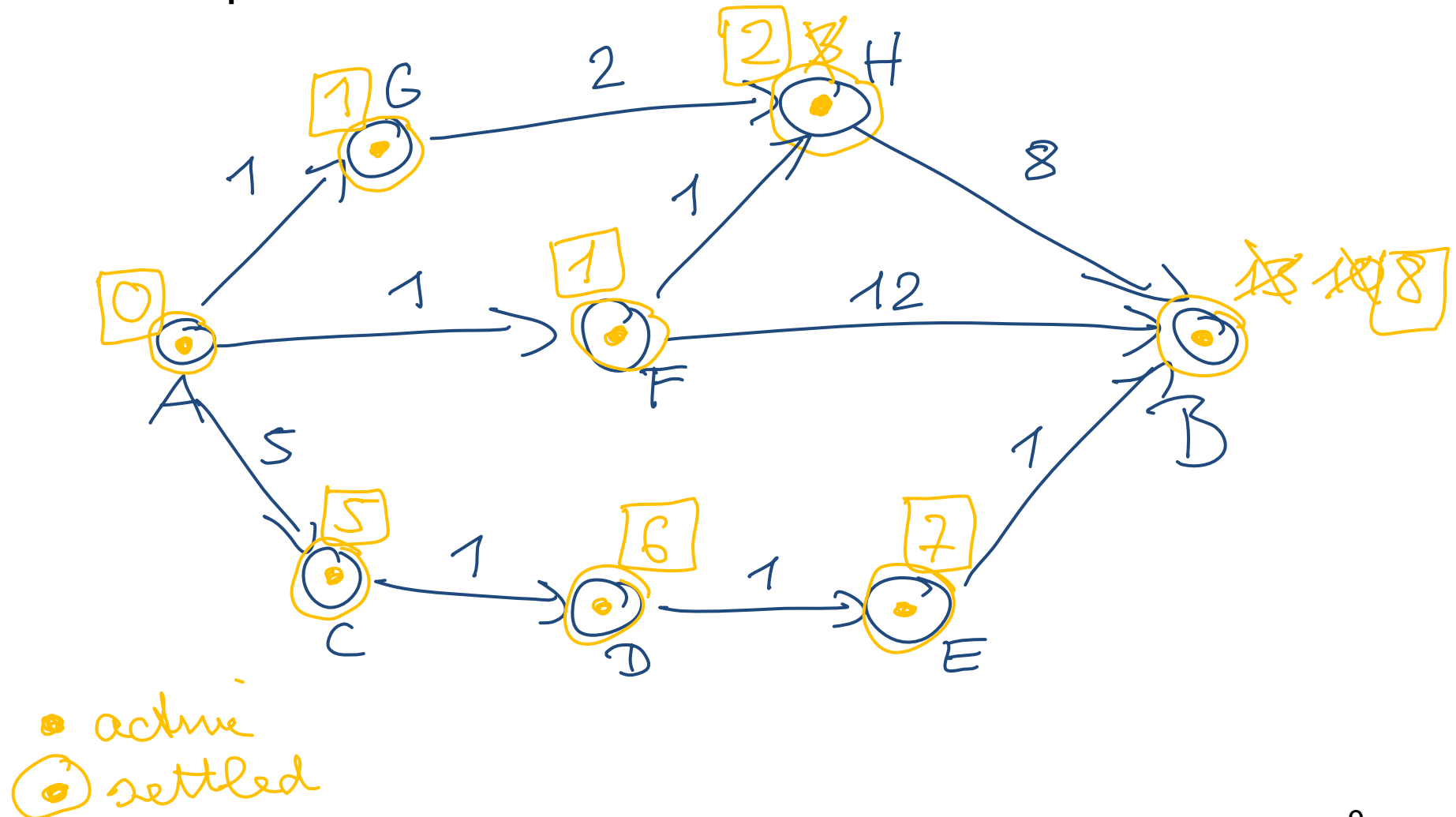
Computing the shortest path ...

- ... and not only its cost

  - Can be easily done along with Dijkstra's algorithm

  - For each node also maintain a **parent** pointer

  - Whenever a node u gets a new tentative distance

    - from a node v via an arc (u, v)

    - set the parent pointer of u to v

  - For costs > 0, these parent pointers can never form a cycle

  - Hence they form a tree (the shortest path tree in the end)

  - The shortest path to any settled node is obtained by following the parent pointers to the source

Computing the shortest paths ...

- ... and not only its cost, here is an example:

Dijkstra's algorithm

■ Example execution

References

- Google Maps JavaScript API V3

  – http://code.google.com/apis/maps/documentation/javascript/

- JavaScript und CSS

  – http://www.w3schools.com/js/default.asp

  – http://www.w3schools.com/css/default.asp

- jQuery

  – http://jquery.com/

- Socket communication, boost::asio

  – http://think-async.com/Asio/Documentation

- AJAX, JSON, JSONP, …

  – Siehe Wikipedia