

9.2 - Algoritma pada Graf (part 2)

[KOMS120403]

Desain dan Analisis Algoritma (2023/2024)

Dewi Sintiar

Prodi S1 Ilmu Komputer
Universitas Pendidikan Ganesha

Week 11 (April 2024)

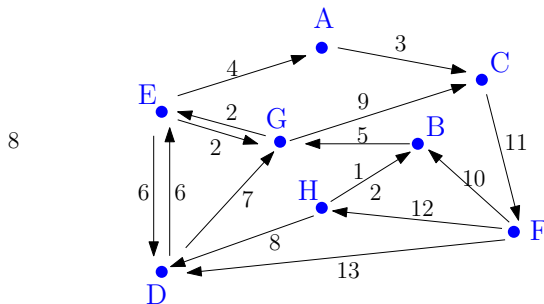
Daftar isi

- Shortest path problem (masalah jarak terdekat)
 - ▶ Algoritma Dijkstra

Bagian 1. Shortest Path

Shortest path

Masalah: diberikan graf berarah berbobot sisi. Temukan jalur terpendek dari s ke t .



Shortest path

Pohon jalur terpendek (*shortest-path tree*) yang berakar pada simpul v adalah pohon rentang (*spanning tree*) T dari graf G , sedemikian sehingga jarak jalur dari akar v ke simpul lain mana pun u di T adalah jalur terpendek jarak dari v ke u di G .

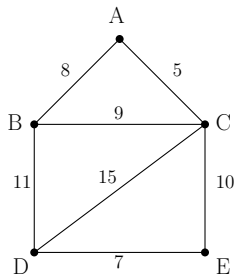


Figure: Graf G

Shortest path

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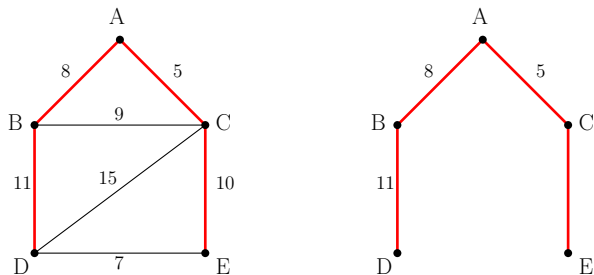


Figure: Yang berwarna merah adalah pohon jalur terpendek dari G berakar pada A

Shortest path

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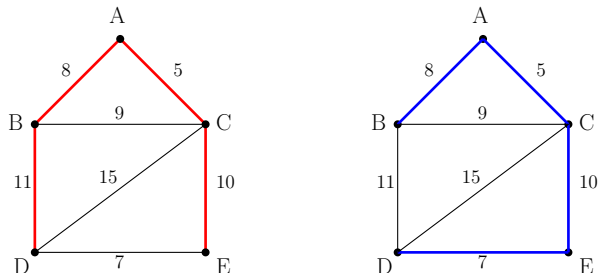


Figure: Yang berwarna merah merupakan pohon jalur terpendek, dan yang biru merupakan MST dari G

Shortest path

Varian dari shortest path

Berdasarkan titik

- Sumber tunggal (*single source*): dari satu simpul s ke setiap simpul lainnya
- Source-sink: dari simpul sumber s ke suatu simpul akhir t
- Semua pasangan: antara semua pasangan simpul

Batasan pada bobot sisi?

- Bobot yang tak-negatif
- Bobot yang merupakan jarak Euclid
- Bobot sebarang

Sirkuit?

- Tanpa sirkuit berarah
- Tanpa “sirkuit negatif”

Penerapan dari shortest path

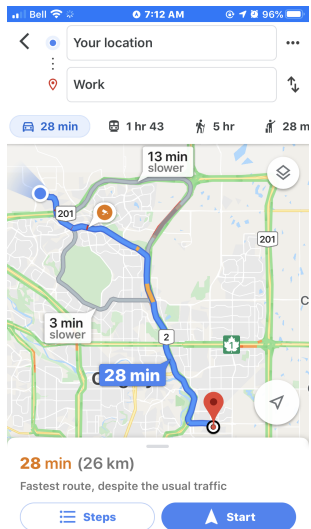


Figure: Mencari rute terpendek pada Google maps

Penerapan dari shortest path



Figure: Sistem navigasi pada mobil

Bagian 2. Algoritma Dijkstra

Algoritma Dijkstra

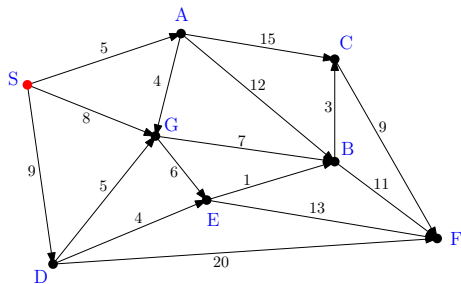


Figure: Edsger W. Dijkstra

Single-source shortest path:

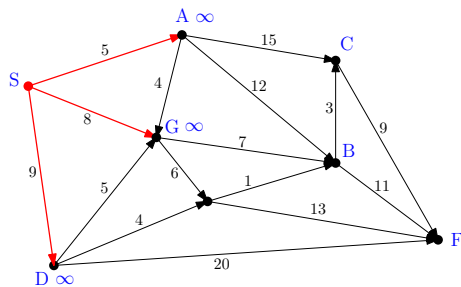
Tujuan: Temukan jalur terpendek dari sumber s ke setiap simpul lainnya.

Algoritma Dijkstra



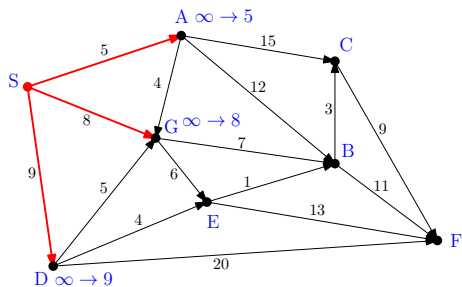
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E	13.0	D → E
F	25.0	B → F
G	8.0	S → G

Algoritma Dijkstra



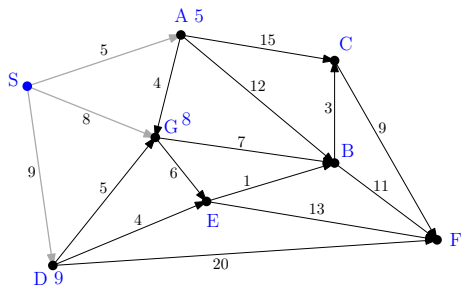
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Algoritma Dijkstra



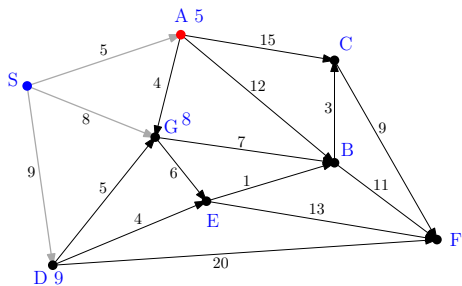
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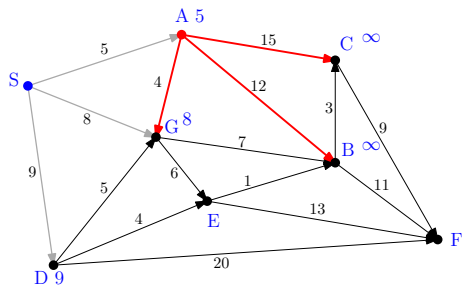
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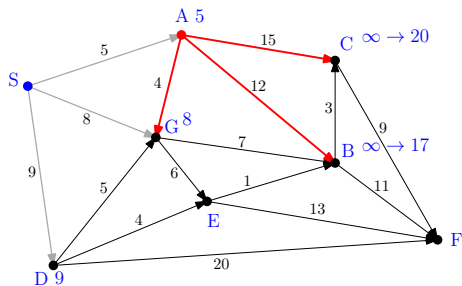
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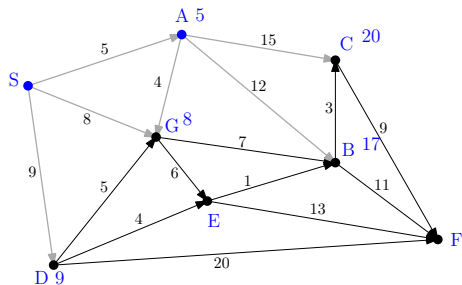
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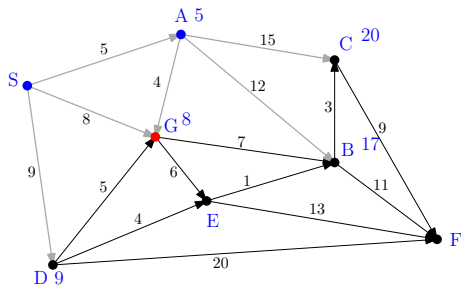
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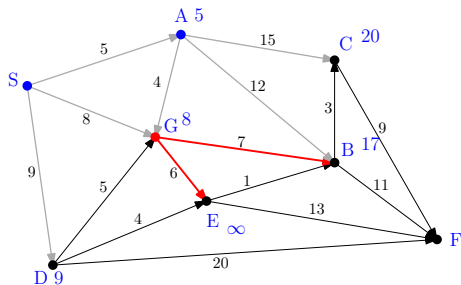
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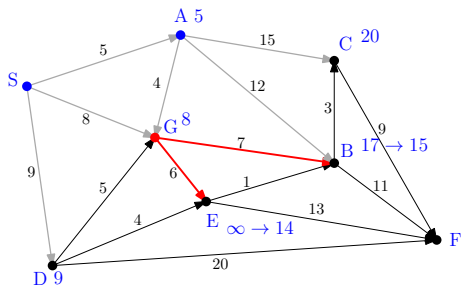
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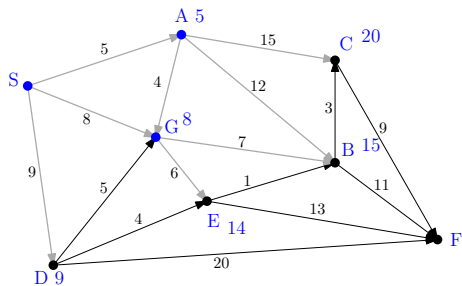
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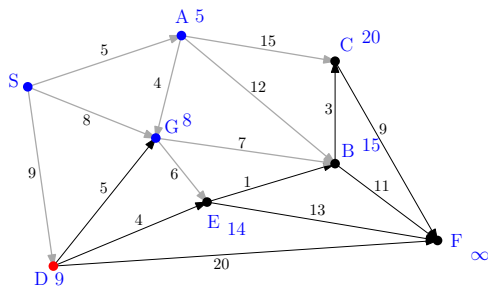
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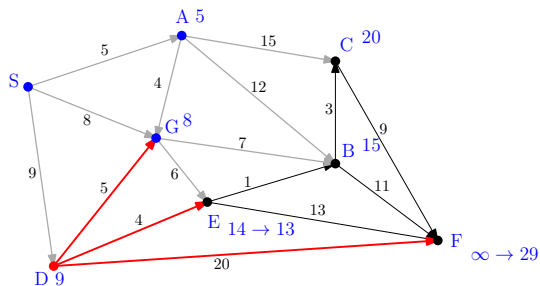
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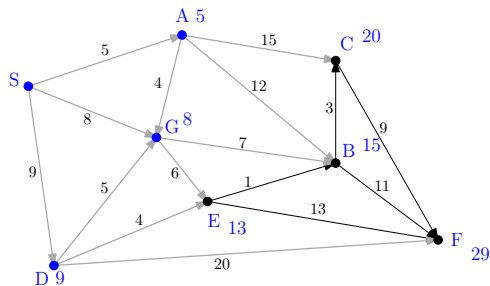
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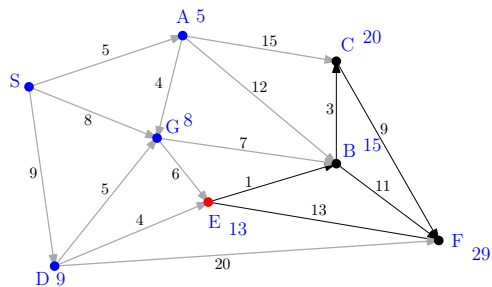
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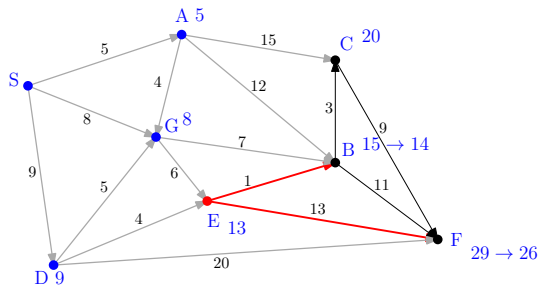
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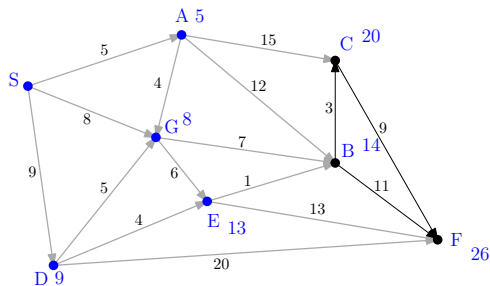
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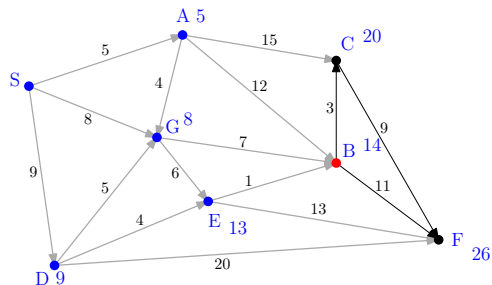
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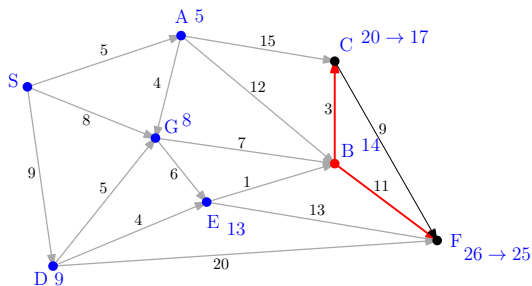
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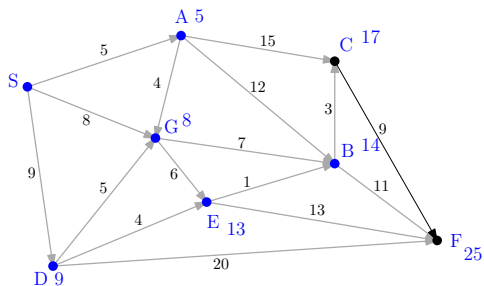
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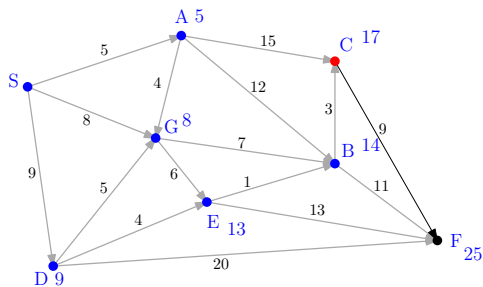
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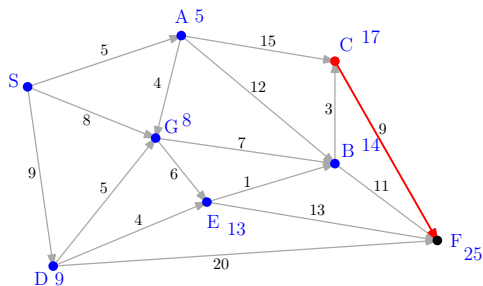
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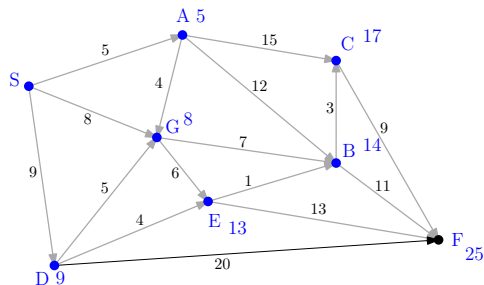
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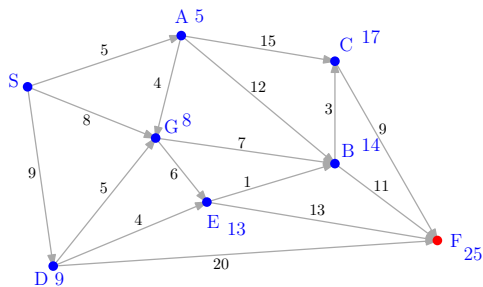
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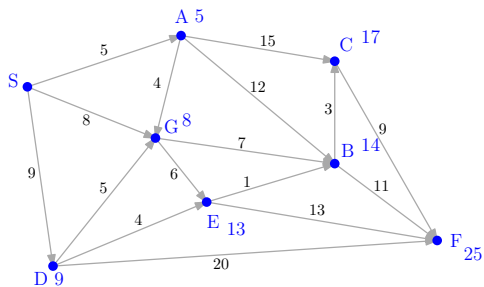
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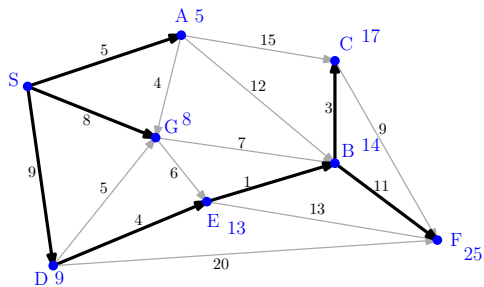
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