



## CREW SCHEDULING

Home

A small airline company maintains 2 daily flights between Salt Lake City, Chicago and Dallas.  
How should the company schedule the crews to minimize cost?

### Flight Schedule

From	To	Departure	Arrival	Departure	Arrival
Salt Lake City	Dallas	9:00 AM	12:00 PM	2:00 PM	5:00 PM
Salt Lake City	Chicago	10:00 AM	2:00 PM	3:00 PM	7:00 PM
Dallas	Salt Lake City	8:00 AM	11:00 AM	2:00 PM	5:00 PM
Dallas	Chicago	9:00 AM	11:00 AM	3:00 PM	5:00 PM
Chicago	Salt Lake City	8:00 AM	12:00 PM	2:00 PM	6:00 PM
Chicago	Dallas	10:00 AM	12:00 PM	4:00 PM	6:00 PM

A crew must leave and arrive in the same city. It is possible to fly the crew back aboard another airline. This would always be on a 8:00 PM flight. There are 6 airplanes in use.  
When a crew is actually flying a plane, the entire crew is paid \$200 per hour. The other time spent (waiting between flights or flying aboard another airplane) costs the company \$75 per hour.

### Possible Crew Rotations

(S=Salt Lake City, D=Dallas, C=Chicago, ( )=Back with other company)

	Flying Hours	Other Hours	Cost	Decision
SD+DS	6	2	\$1,350	0
SD+(DS)	3	11	\$1,425	0
SD+DC+(CS)	5	10	\$1,750	0
SC+(CS)	4	10	\$1,550	0
SC+CD+(DS)	6	5	\$1,575	0
DS+SD	6	3	\$1,425	0
DS+(SD)	3	12	\$1,500	0
DS+SC+(CD)	7	7	\$1,925	0
DC+CS+(SD)	6	5	\$1,575	0
DC+CD	4	5	\$1,175	0
CS+SD+(DC)	7	7	\$1,925	0
CS+SC	8	3	\$1,825	0

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### USER TYPE

Please select

### INDUSTRY TYPE

Please select

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CD+DC	4	3	\$1,025	0
CD+DS+(SC)	7	9	\$2,075	0
Total Cost			\$0	

#### Twelve Flight Constraints

Flight	Number of crews
SD 1	0
SD 2	0
SC 1	0
SC 2	0
DS 1	0
DS 2	0
DC 1	0
DC 2	0
CS 1	0
CS 2	0
CD 1	0
CD 2	0

At least 7 printable characters that you can remember.

**FIRST & LAST NAME**

**COMPANY OR UNIVERSITY**

**COUNTRY CODE**

Spain +34

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#### Problem

An airline company maintains a schedule of two daily flights between Salt Lake City, Dallas and Chicago. A crew that leaves a city in the morning has to return there at night. The crew can be brought back on another airline. There are 6 airplanes in use. When a crew is flying, the cost is \$200 per hour. When a crew is waiting or being flown back, the cost is \$75. How should the company schedule its crews to minimize cost?

#### Solution

1) The airline has already determined what all the possible crew rotations can be. The variables are the binary integer decisions to accept rotations. In worksheet Crew these are defined as Rotation\_decisions.

2) The constraints are simple. We want only one crew per flight. This gives

$$\text{Crews\_on\_flight} = 1$$

and the logical constraint gives

$$\text{Rotation\_decisions} = \text{binary}$$

3) The objective is to minimize total cost. On worksheet Crew this cell is given the name Total\_cost.

#### Remarks

Please confirm for yourself that the crew rotations chosen meet the required schedule. More sophisticated versions of this model are widely used in the airline industry, but the same approach can be used in scheduling truck drivers, boat crews, etc.

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