1. 根据List-Scheduling算法求解如下负载平衡问题。

List-Scheduling $(m, n, t_1, \ldots, t_n)$

For $i = 1$ to m

$L[i] = 0.$

$S[i] \leftarrow \emptyset.$

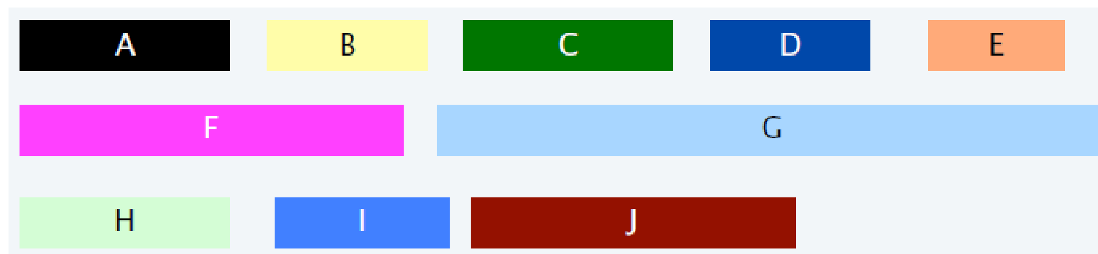
For $j = 1$ to n

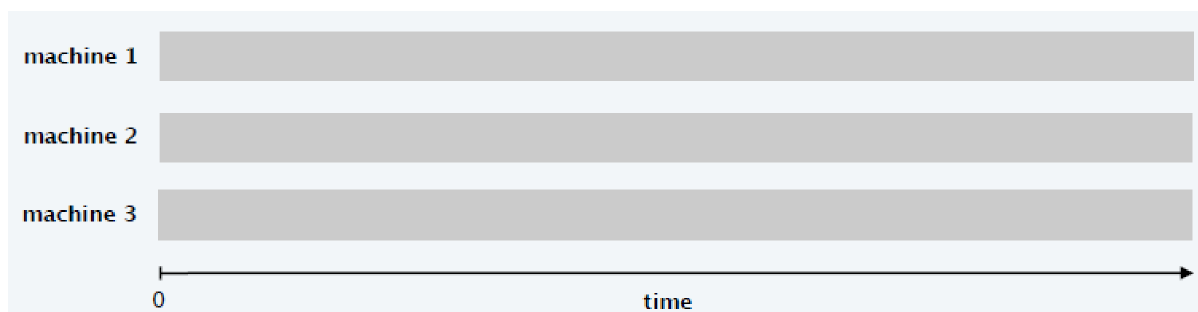
$i \leftarrow argmin_k L[k].$

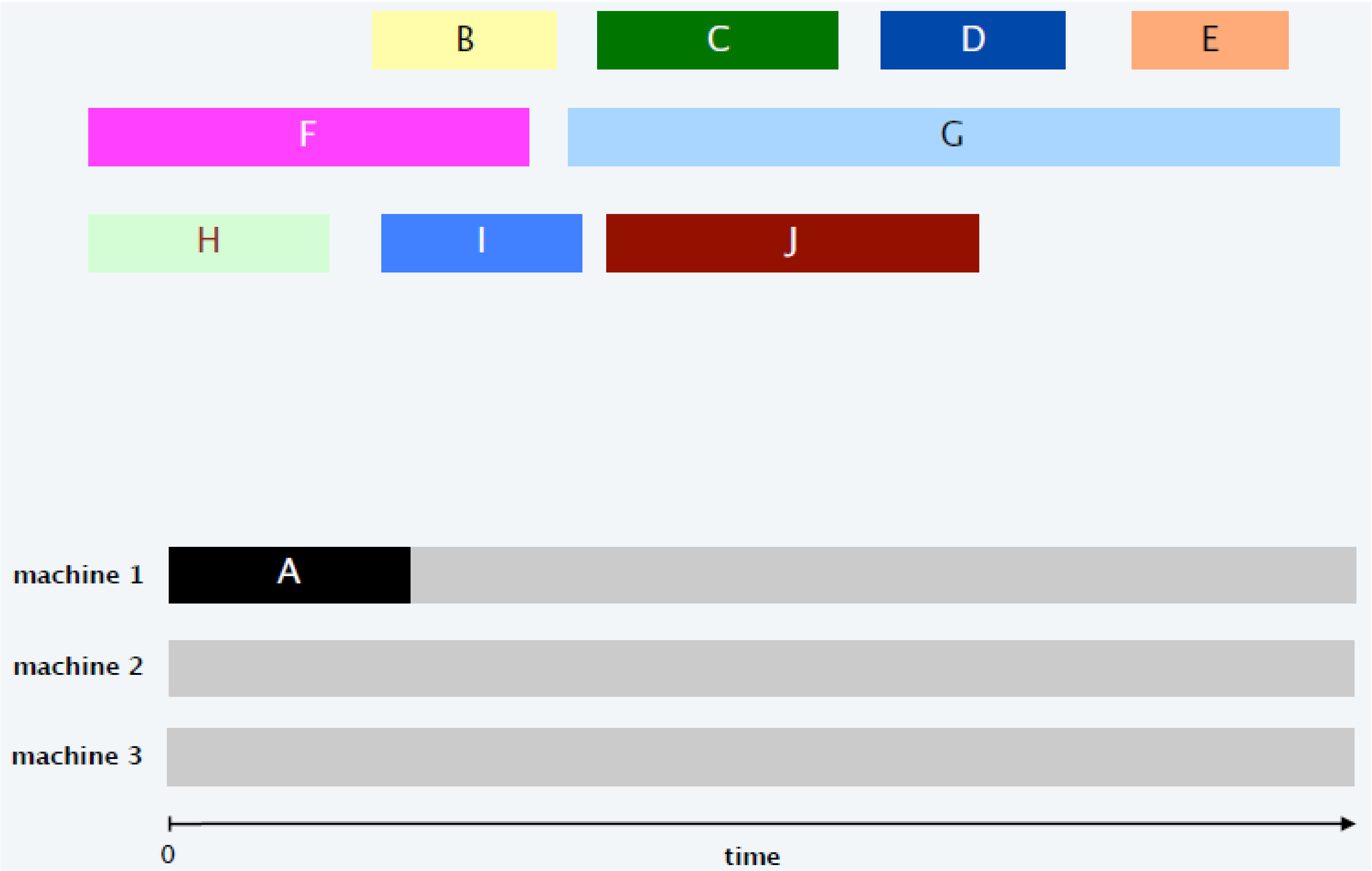
$S[i] \leftarrow S[i] \cup \{j\}.$

$L[i] \leftarrow L[i] + t_j.$

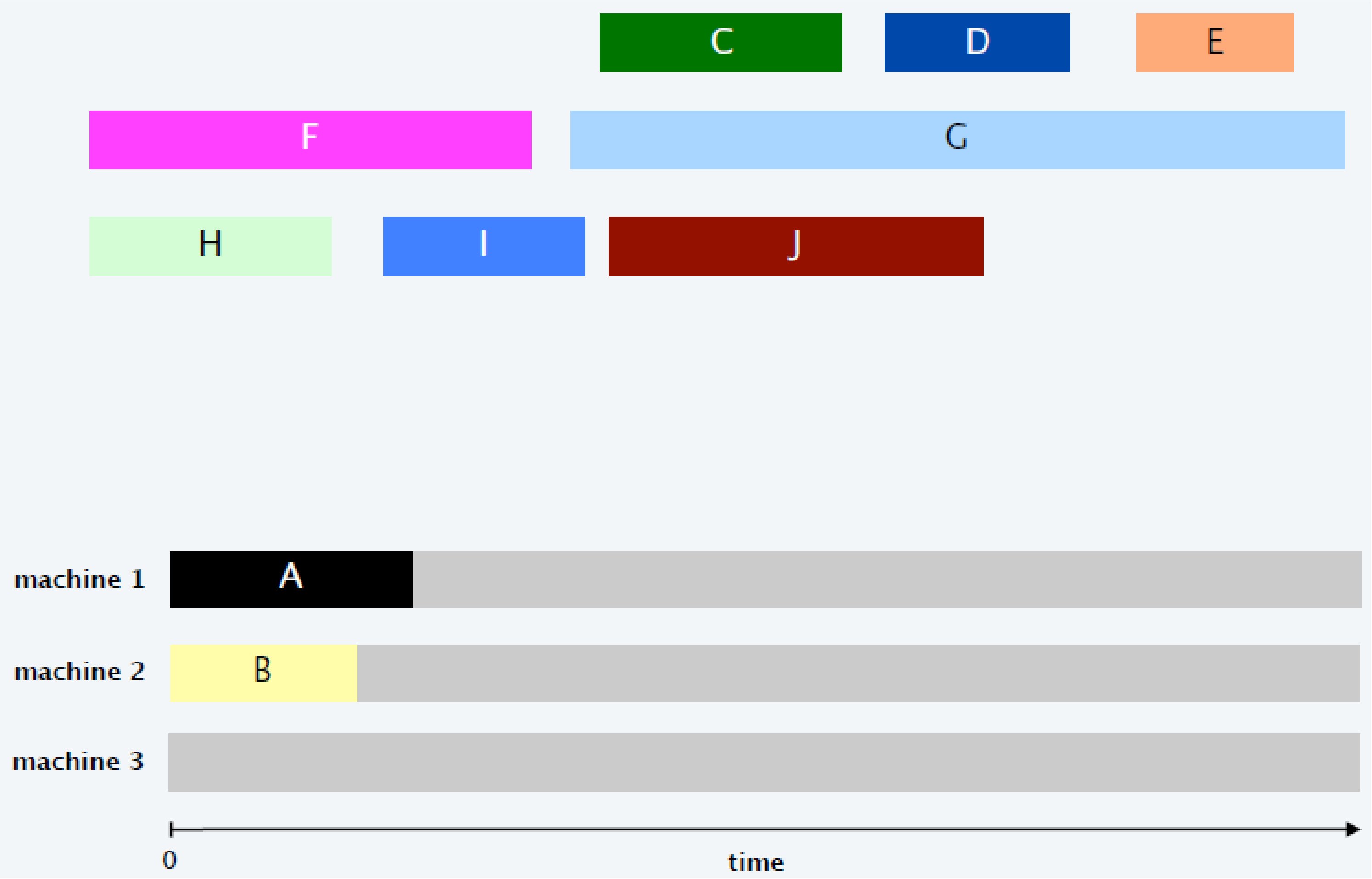
Return $S[1], S[2], \ldots, S[m].$

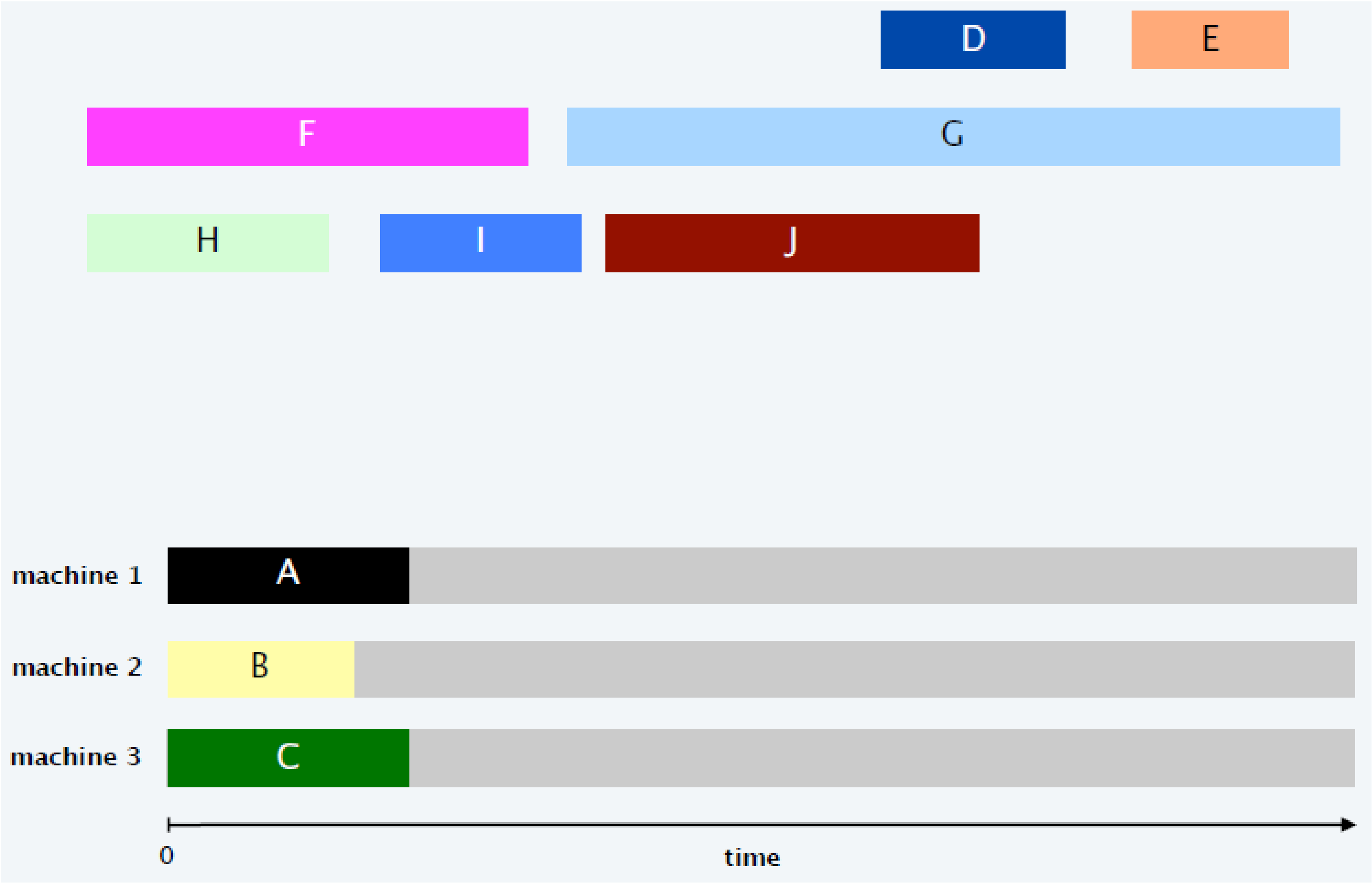


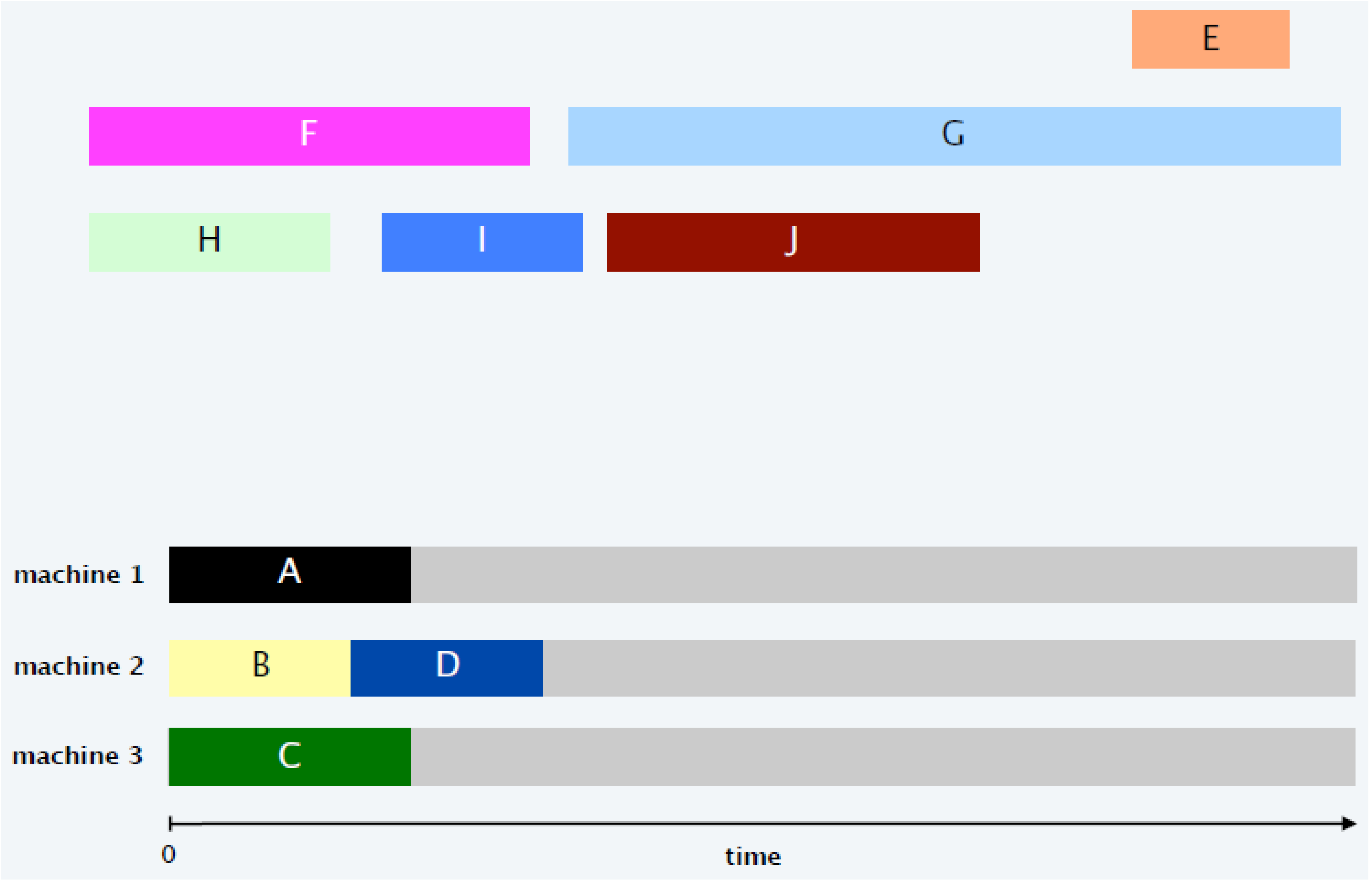


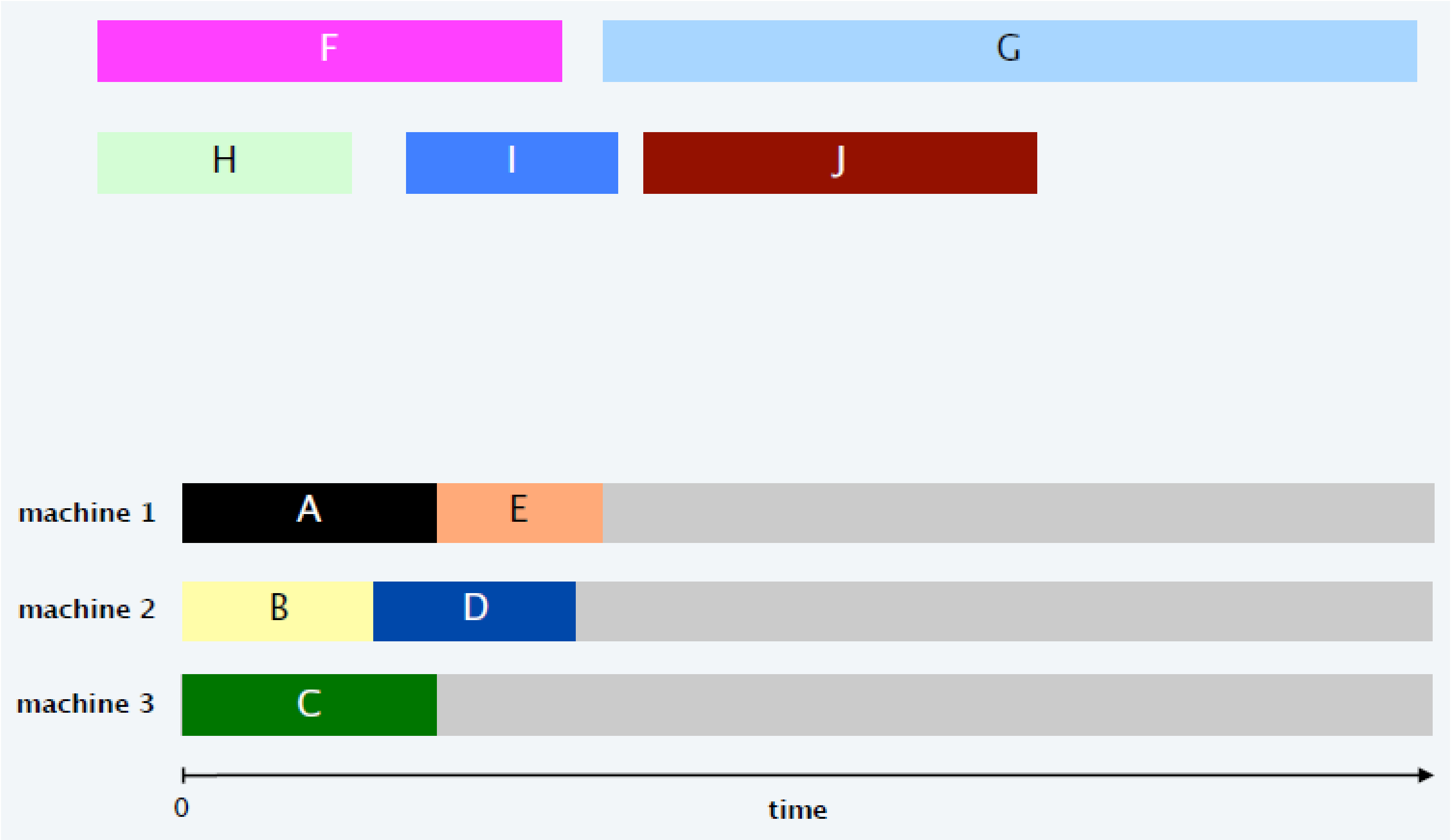


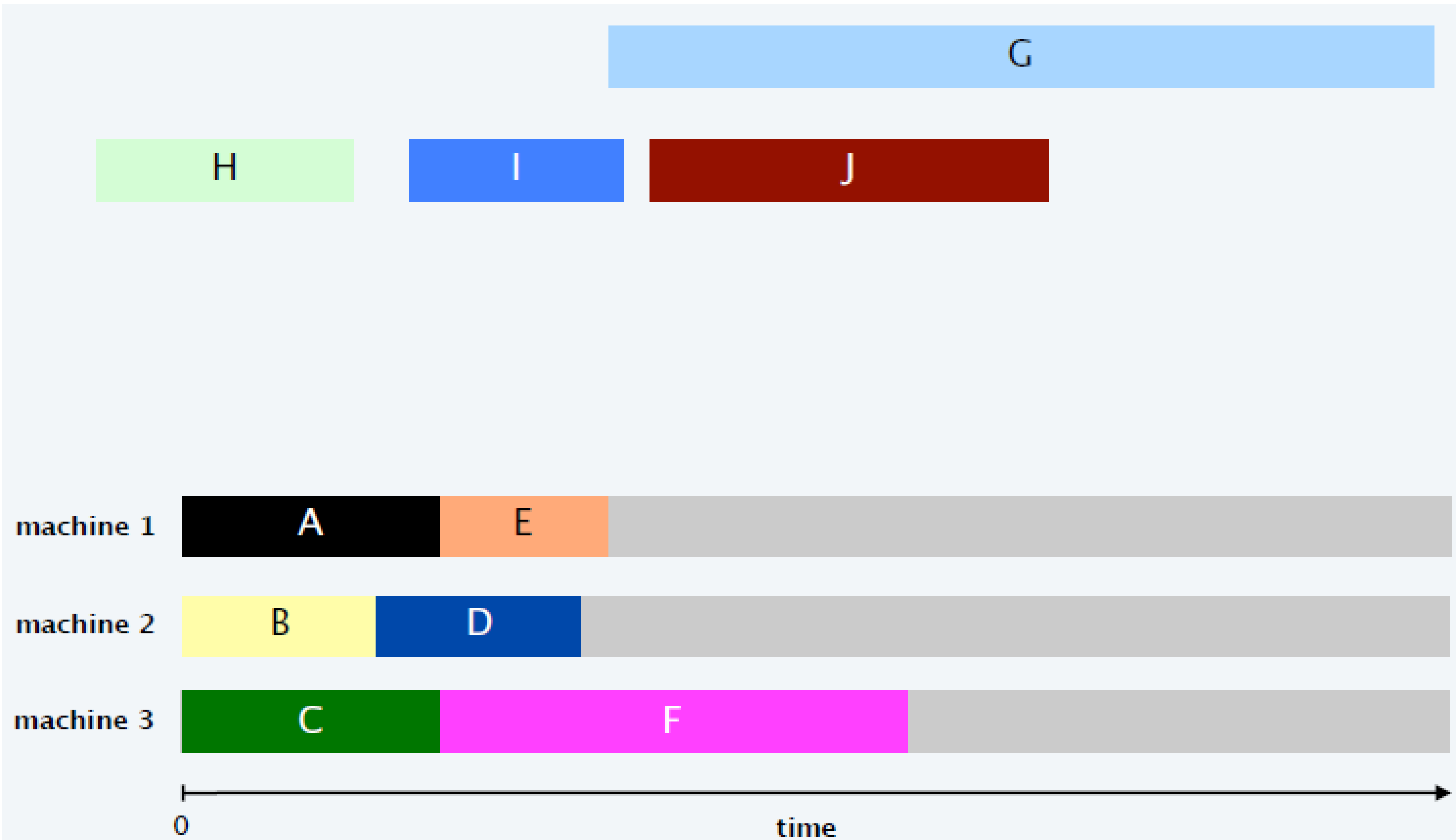
B
C
D
E
F
G
H
I
J
machine 1
A
machine 2
machine 3
0
time

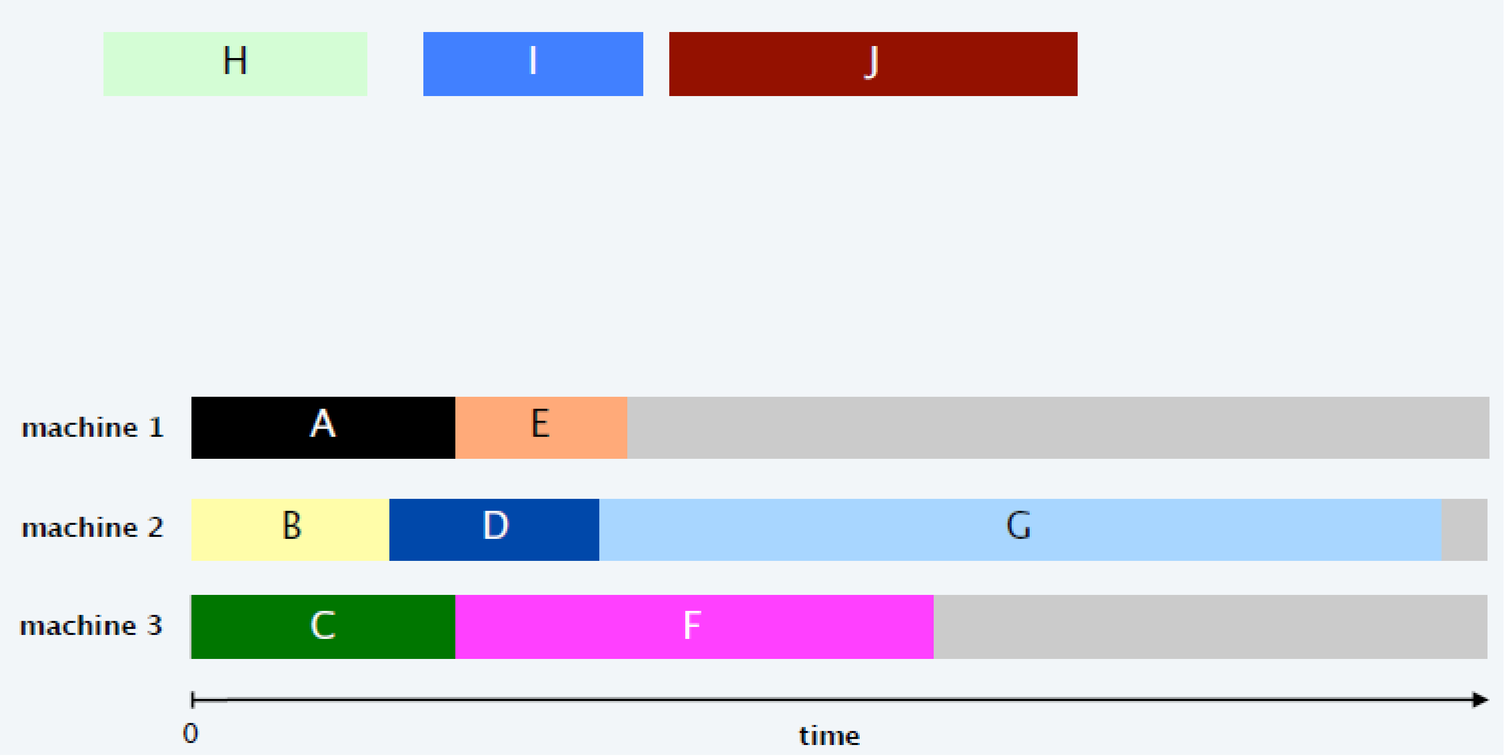

C
D
E
F
G
H
I
J
machine 1
A
machine 2
B
machine 3
0
time

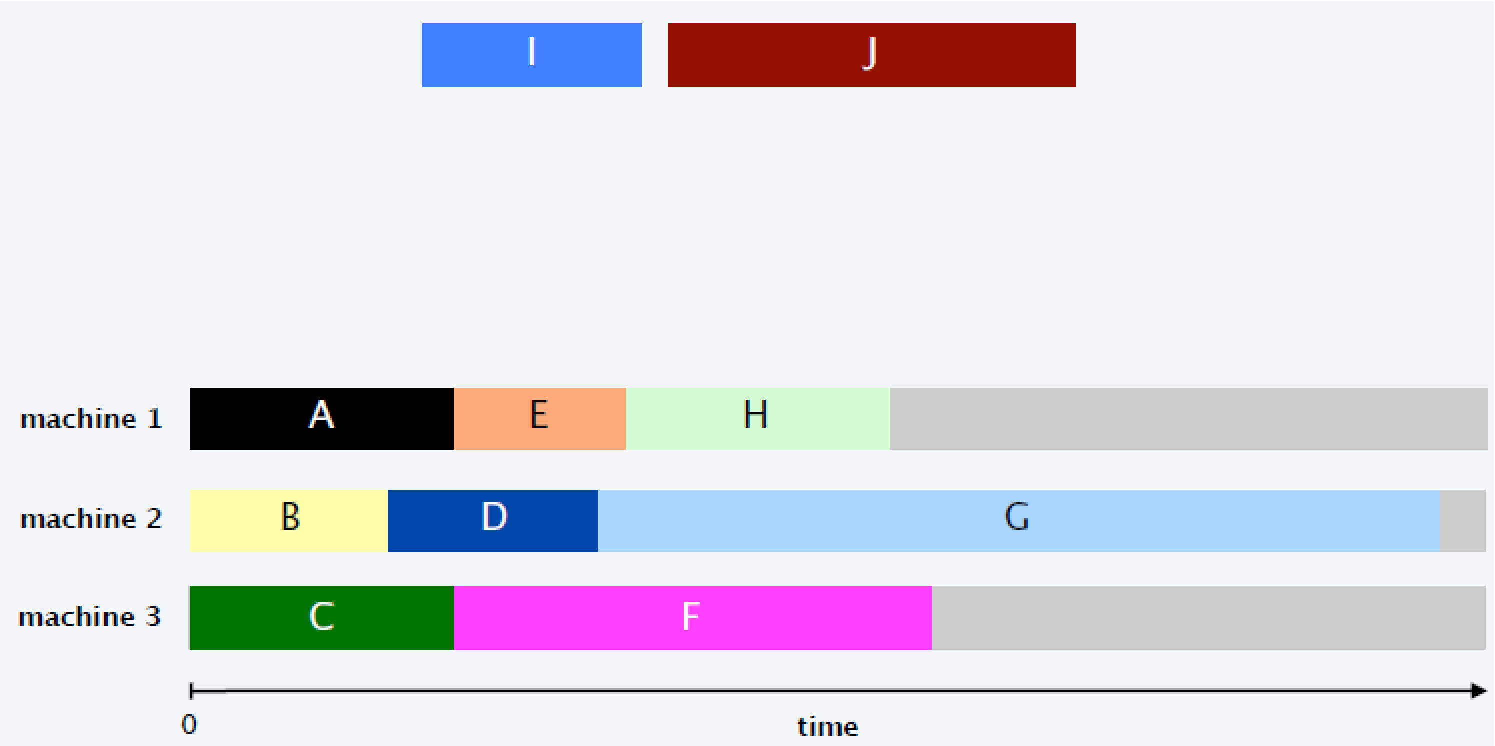

D
E
F
G
H
I
J
machine 1
A
machine 2
B
machine 3
C
0
time


E
F
G
H
I
J
machine 1
A
machine 2
B
D
machine 3
C
0
time

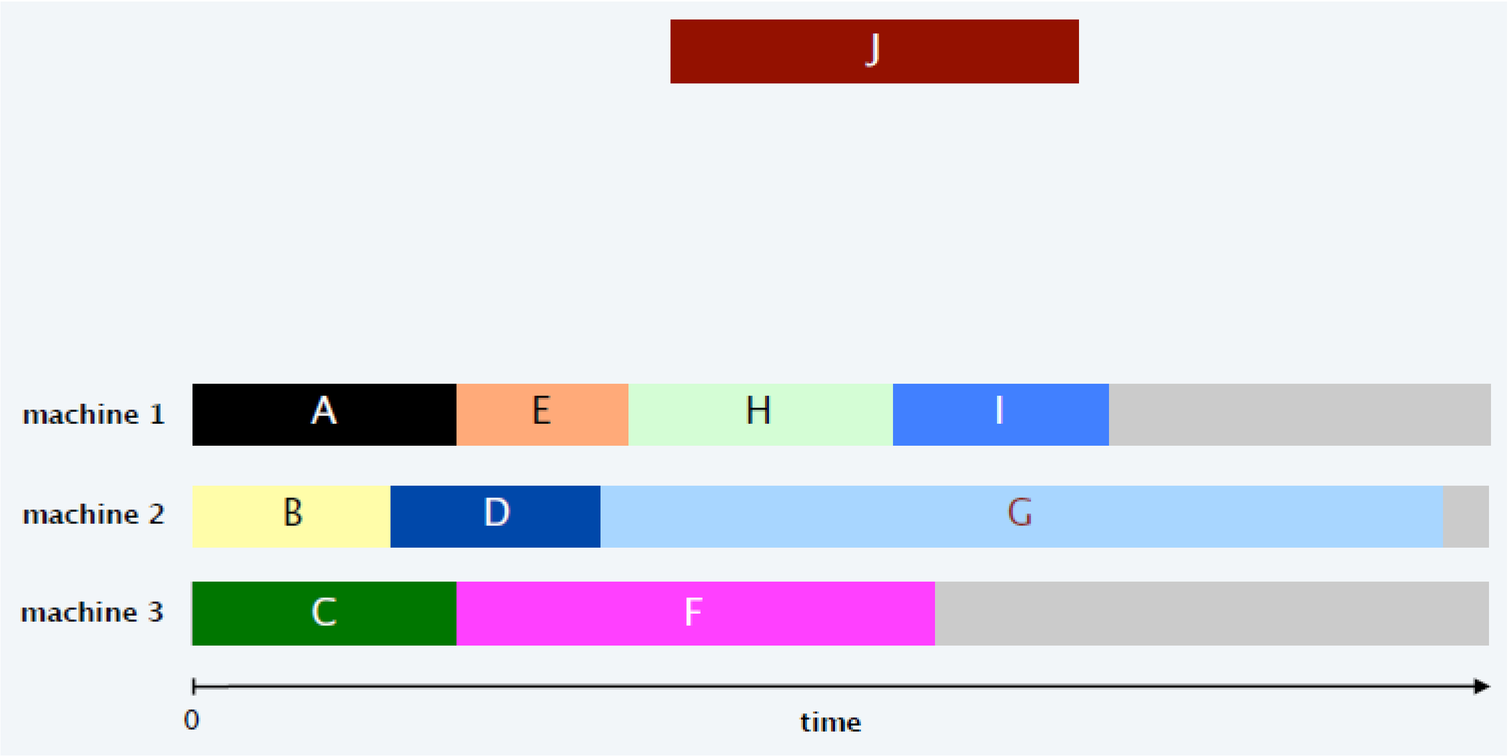

F
G
H
I
J
machine 1
A
E
machine 2
B
D
machine 3
C
0
time

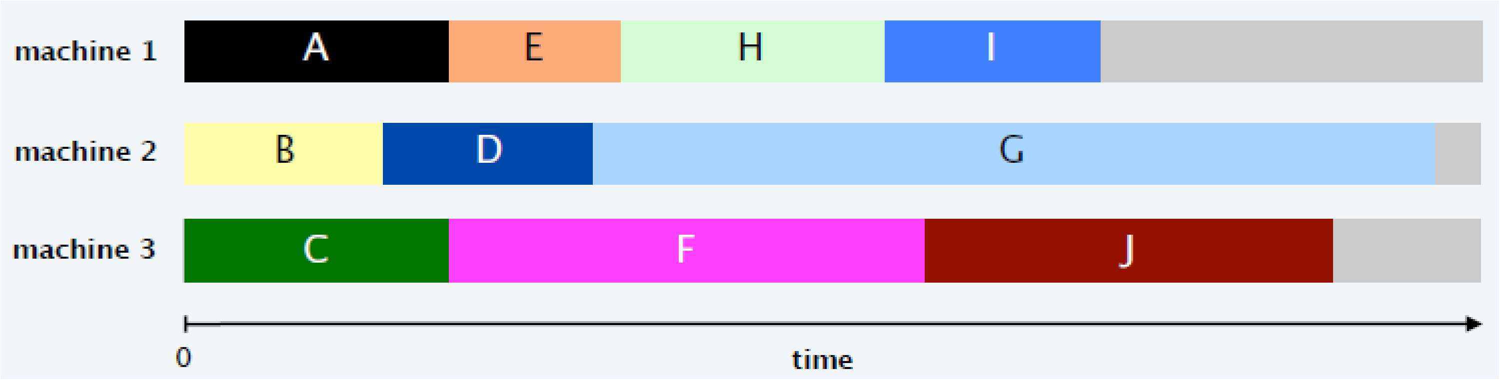

G
H
I
J
machine 1
A
E
machine 2
B
D
machine 3
C
F
0
time

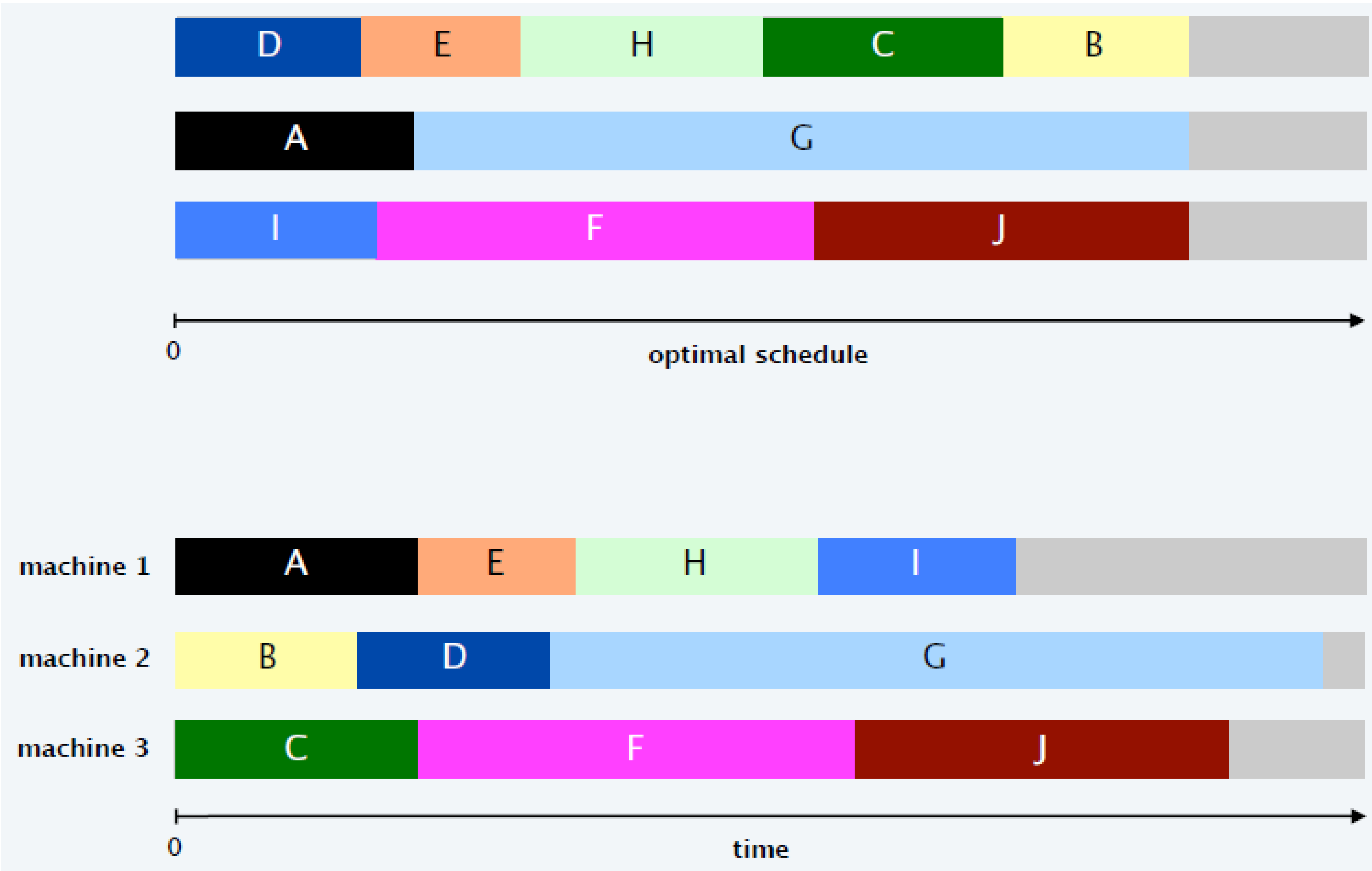

H
I
J
machine 1
A
E
machine 2
B
D
G
machine 3
C
F
0
time



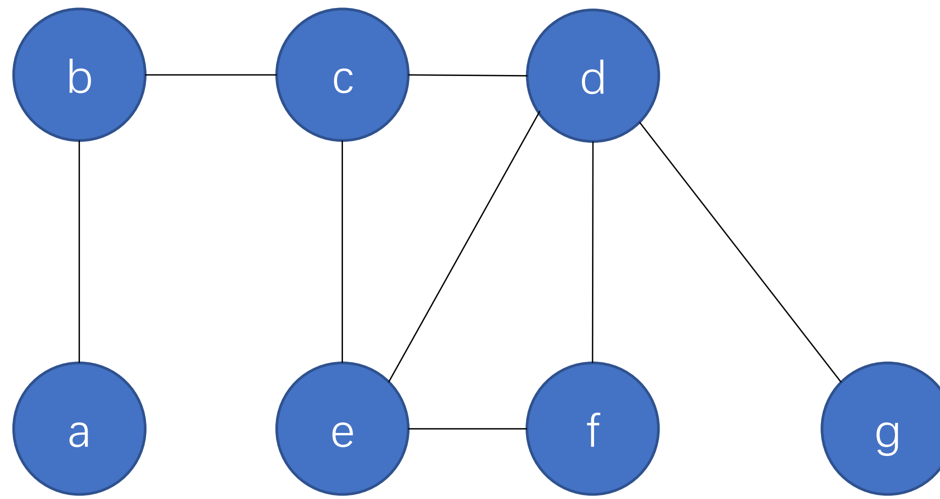
I
J
machine 1
A
E
H
machine 2
B
D
G
machine 3
C
F
0
time


J
machine 1
A
E
H
I
machine 2
B
D
G
machine 3
C
F
0
time


machine 1
A
E
H
I
machine 2
B
D
G
machine 3
C
F
J
0
time


D
E
H
C
B
A
G
I
F
J
0
optimal schedule
machine 1
A
E
H
I
machine 2
B
D
G
machine 3
C
F
J
0
time

2. 根据VCOVER-APPROX算法找出下图的一个顶点覆盖。

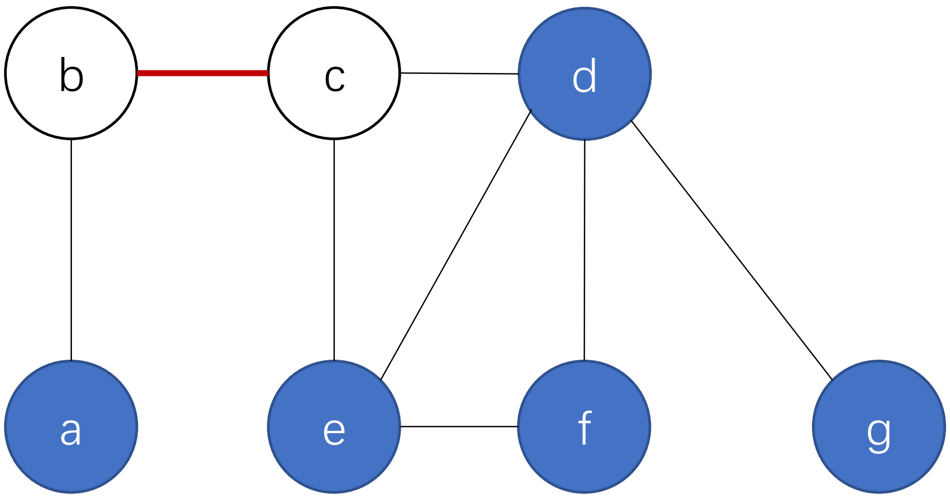


VCOVER-APPROX算法

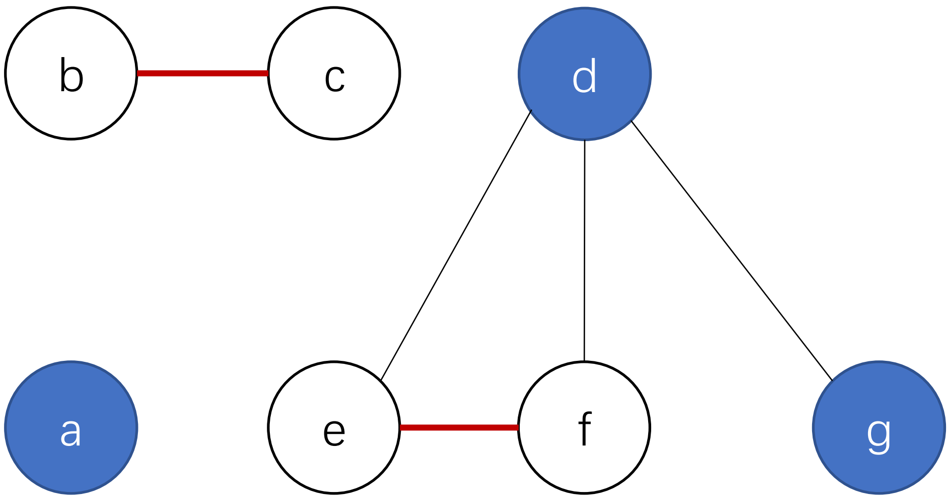
输入： 无向图 G=(V,E)

输出：G的一个顶点覆盖C

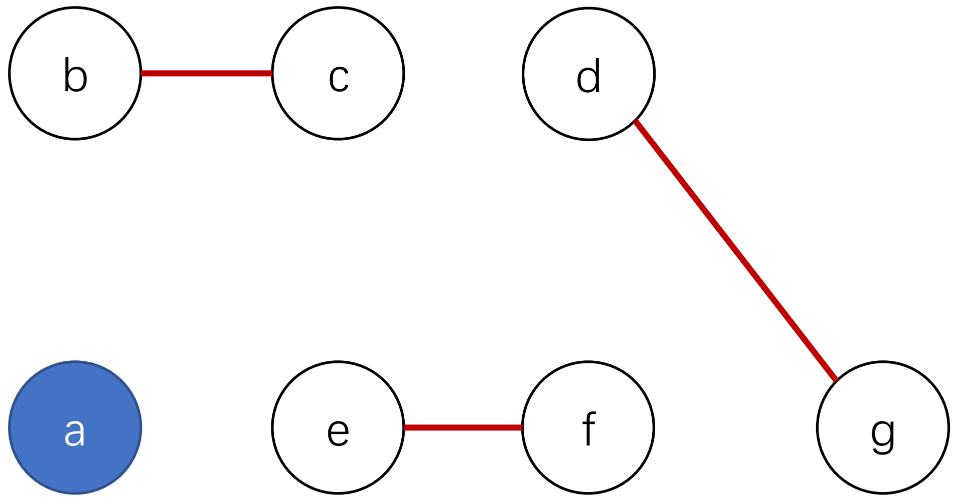
1. C ← { }
2. while E ≠ { }
3. 设 e=(u,v)为E中的任意边
4. C ← C ∪ {u,v}
5. 删除 e 和 E中所有与u和v相关联的边
6. end while



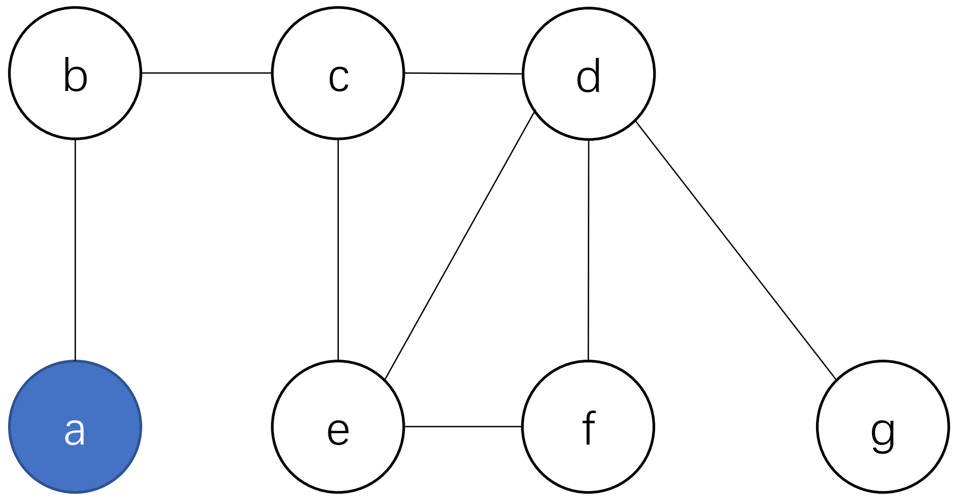
选择(b, c)边，并删去b、c所连接的边



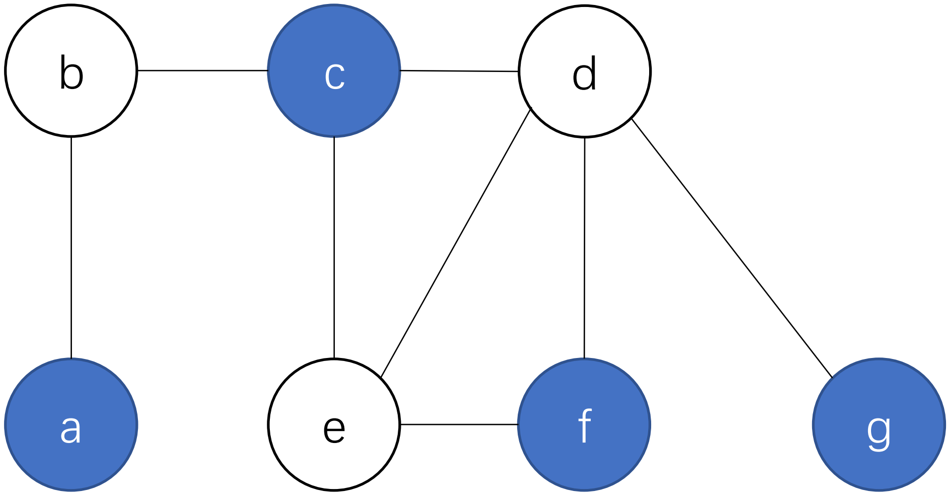
选择(e, f)边，并删去e、f所连接的边



选择(d, g)边



产生一个覆盖：b, c, d, e, f, g



最小覆盖为b, d, e

3. 给定线性规划问题如下：

$$\max\ z = 3x_1 + 2x_2$$
$$s.t.\ \ 2x_1 + x_2 \le 4$$
$$2x_1 + 3x_2 \le 6$$
$$x_i \ge 0\ (i = 1,2)$$

（1）把上述形式转成标准型的线性规划问题。

（2）用单纯型法求解z的最大值，并且给出z最大时各个变量的值。

3. 给定线性规划问题如下：

$$\begin{aligned} \max\ z &= 3x_1 + 2x_2 \\ s.t.\ \ 2x_1 + x_2 &\leq 4 \\ 2x_1 + 3x_2 &\leq 6 \\ x_i &\geq 0\ (i = 1,2) \end{aligned}$$

（1）把上述形式转成标准型的线性规划问题。

$$\begin{aligned} \max\ z &= 3x_1 + 2x_2 \\ s.t.\ \ 2x_1 + x_2 + x_3 &= 4 \\ 2x_1 + 3x_2 + x_4 &= 6 \\ x_i &\geq 0\ (i = 1,2,3,4) \end{aligned}$$

3. 给定线性规划问题如下：

$$\max\ z = 3x_1 + 2x_2$$
$$s.t.\ \ 2x_1 + x_2 \le 4$$
$$2x_1 + 3x_2 \le 6$$
$$x_i \ge 0\ (i = 1,2)$$

（2）用单纯型法求解z的最大值，并且给出z最大时各个变量的值。

		1	3	0	0		
		x1	x2	x3	x4	RHS	Ratio
0	x3	2	1	1	0	4	4/2
0	x4	2	3	0	1	6	6/2
检验数		3	2	0	0		

当前基本可行解：(0, 0, 4, 6)，z=0

3. 给定线性规划问题如下：

$$\max\ z = 3x_1 + 2x_2$$
$$s.t.\ \ 2x_1 + x_2 \le 4$$
$$2x_1 + 3x_2 \le 6$$
$$x_i \ge 0\ (i = 1,2)$$

（2）用单纯型法求解z的最大值，并且给出z最大时各个变量的值。

		1	3	0	0		
		x1	x2	x3	x4	RHS	Ratio
0	x1	1	1/2	1/2	0	2	2/(1/2)
0	x4	0	2	-1	1	2	2/2
检验数		0	1/2	-3/2	0		

当前基本可行解：(2, 0, 0, 2)，z=6

3. 给定线性规划问题如下：

$$\max\ z = 3x_1 + 2x_2$$
$$s.t.\ \ 2x_1 + x_2 \le 4$$
$$2x_1 + 3x_2 \le 6$$
$$x_i \ge 0\ (i = 1,2)$$

（2）用单纯型法求解z的最大值，并且给出z最大时各个变量的值。

		1	3	0	0		
		x1	x2	x3	x4	RHS	Ratio
0	x1	1	0	3/4	-1/4	3/2	
0	x2	0	1	-1/2	1/2	1	
检验数		0	0	-5/4	-1/4		

当前基本可行解：(3/2, 1, 0, 0)，z=13/2