

# Scheduling Report

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## 1 Introduction

Table 1: Problem

| Name | Timepoints<br>as<br>Date | Nr<br>Products | Nr<br>Process | Nr<br>Disjunctive<br>Resources | Nr<br>Cumulative<br>Resources | Nr<br>Orders | Nr<br>Jobs | Nr<br>Tasks |
|------|--------------------------|----------------|---------------|--------------------------------|-------------------------------|--------------|------------|-------------|
| P1   | true                     | 5              | 5             | 8                              | 1                             | 50           | 50         | 200         |

## 2 Orders

Table 2: Orders (Total 50)

| Name   | Product | Process   | Qty | Release | Due   | Earliness Weight | Lateness Weight |
|--------|---------|-----------|-----|---------|-------|------------------|-----------------|
| Order0 | Prod4   | Process 4 | 4   | 0       | 928   | 1.00             | 1.00            |
| Order1 | Prod4   | Process 4 | 1   | 0       | 2,546 | 1.00             | 1.00            |
| Order2 | Prod3   | Process 3 | 1   | 0       | 2,809 | 1.00             | 1.00            |
| Order3 | Prod3   | Process 3 | 4   | 0       | 506   | 1.00             | 1.00            |
| Order4 | Prod1   | Process 1 | 5   | 0       | 800   | 1.00             | 1.00            |
| Order5 | Prod0   | Process 0 | 7   | 0       | 159   | 1.00             | 1.00            |
| Order6 | Prod3   | Process 3 | 5   | 0       | 2,759 | 1.00             | 1.00            |
| Order7 | Prod1   | Process 1 | 5   | 0       | 1,852 | 1.00             | 1.00            |

| Name    | Product | Process   | Qty | Release | Due   | Earliness Weight | Lateness Weight |
|---------|---------|-----------|-----|---------|-------|------------------|-----------------|
| Order8  | Prod1   | Process 1 | 2   | 0       | 287   | 1.00             | 1.00            |
| Order9  | Prod1   | Process 1 | 4   | 0       | 80    | 1.00             | 1.00            |
| Order10 | Prod1   | Process 1 | 8   | 0       | 1,696 | 1.00             | 1.00            |
| Order11 | Prod4   | Process 4 | 4   | 0       | 1,838 | 1.00             | 1.00            |
| Order12 | Prod3   | Process 3 | 5   | 0       | 2,542 | 1.00             | 1.00            |
| Order13 | Prod2   | Process 2 | 5   | 0       | 1,013 | 1.00             | 1.00            |
| Order14 | Prod3   | Process 3 | 2   | 0       | 1,602 | 1.00             | 1.00            |
| Order15 | Prod2   | Process 2 | 5   | 0       | 2,862 | 1.00             | 1.00            |
| Order16 | Prod2   | Process 2 | 6   | 0       | 335   | 1.00             | 1.00            |
| Order17 | Prod2   | Process 2 | 9   | 0       | 2,403 | 1.00             | 1.00            |
| Order18 | Prod3   | Process 3 | 6   | 0       | 2,691 | 1.00             | 1.00            |
| Order19 | Prod3   | Process 3 | 9   | 0       | 2,773 | 1.00             | 1.00            |
| Order20 | Prod3   | Process 3 | 9   | 0       | 657   | 1.00             | 1.00            |
| Order21 | Prod1   | Process 1 | 5   | 0       | 2,725 | 1.00             | 1.00            |
| Order22 | Prod1   | Process 1 | 4   | 0       | 1,851 | 1.00             | 1.00            |
| Order23 | Prod4   | Process 4 | 6   | 0       | 2,641 | 1.00             | 1.00            |
| Order24 | Prod2   | Process 2 | 4   | 0       | 1,854 | 1.00             | 1.00            |
| Order25 | Prod1   | Process 1 | 3   | 0       | 100   | 1.00             | 1.00            |
| Order26 | Prod0   | Process 0 | 7   | 0       | 2,440 | 1.00             | 1.00            |
| Order27 | Prod4   | Process 4 | 3   | 0       | 1,701 | 1.00             | 1.00            |
| Order28 | Prod4   | Process 4 | 9   | 0       | 311   | 1.00             | 1.00            |
| Order29 | Prod3   | Process 3 | 5   | 0       | 251   | 1.00             | 1.00            |
| Order30 | Prod2   | Process 2 | 4   | 0       | 2,739 | 1.00             | 1.00            |
| Order31 | Prod2   | Process 2 | 3   | 0       | 2,439 | 1.00             | 1.00            |
| Order32 | Prod0   | Process 0 | 8   | 0       | 104   | 1.00             | 1.00            |
| Order33 | Prod0   | Process 0 | 1   | 0       | 1,955 | 1.00             | 1.00            |
| Order34 | Prod2   | Process 2 | 7   | 0       | 2,488 | 1.00             | 1.00            |
| Order35 | Prod3   | Process 3 | 3   | 0       | 348   | 1.00             | 1.00            |
| Order36 | Prod1   | Process 1 | 3   | 0       | 2,719 | 1.00             | 1.00            |
| Order37 | Prod3   | Process 3 | 8   | 0       | 1,664 | 1.00             | 1.00            |
| Order38 | Prod4   | Process 4 | 9   | 0       | 2,348 | 1.00             | 1.00            |
| Order39 | Prod3   | Process 3 | 3   | 0       | 1,947 | 1.00             | 1.00            |
| Order40 | Prod2   | Process 2 | 8   | 0       | 2,304 | 1.00             | 1.00            |
| Order41 | Prod0   | Process 0 | 4   | 0       | 2,703 | 1.00             | 1.00            |
| Order42 | Prod3   | Process 3 | 5   | 0       | 384   | 1.00             | 1.00            |
| Order43 | Prod0   | Process 0 | 3   | 0       | 2,821 | 1.00             | 1.00            |

| Name    | Product | Process   | Qty | Release | Due   | Earliness Weight | Lateness Weight |
|---------|---------|-----------|-----|---------|-------|------------------|-----------------|
| Order44 | Prod3   | Process 3 | 5   | 0       | 1,885 | 1.00             | 1.00            |
| Order45 | Prod1   | Process 1 | 8   | 0       | 1,333 | 1.00             | 1.00            |
| Order46 | Prod3   | Process 3 | 9   | 0       | 1,386 | 1.00             | 1.00            |
| Order47 | Prod3   | Process 3 | 2   | 0       | 837   | 1.00             | 1.00            |
| Order48 | Prod0   | Process 0 | 5   | 0       | 2,088 | 1.00             | 1.00            |
| Order49 | Prod2   | Process 2 | 1   | 0       | 2,669 | 1.00             | 1.00            |

### 3 Solution

Table 3: Relaxation of Constraints

| Name | Enforce Release Date | Enforce Due Date | Enforce Cumulative | Enforce WiP | Enforce Downtime | Nr Threads | Timeout |
|------|----------------------|------------------|--------------------|-------------|------------------|------------|---------|
| Sol1 | true                 | false            | true               | true        | true             | 2          | 60      |
| Sol2 | true                 | false            | false              | true        | true             | 2          | 60      |
| Sol3 | true                 | false            | false              | false       | false            | 2          | 60      |

Table 4: Solutions (Total 3)

| Name | Solver Status | Objective Value | Bound   | Gap  | Makespan | Flowtime | Total Lateness | Max Lateness | Nr Late | Total Earliness | Max Earliness | Nr Early | Model Type | Objective Type | Time  |
|------|---------------|-----------------|---------|------|----------|----------|----------------|--------------|---------|-----------------|---------------|----------|------------|----------------|-------|
| Sol1 | Solution      | 2,653           | 1732.00 | 0.35 | 2,653    | 70,840   | 21,930         | 2,287        | 20      | 35,263          | 2,687         | 30       | CPO        | Makespan       | 60.15 |
| Sol2 | Solution      | 2,164           | 650.00  | 0.70 | 2,164    | 69,782   | 16,045         | 1,947        | 19      | 30,436          | 2,674         | 31       | CPO        | Makespan       | 60.05 |
| Sol3 | Solution      | 2,132           | 774.00  | 0.64 | 2,132    | 64,124   | 14,091         | 1,901        | 18      | 34,140          | 2,717         | 32       | CPO        | Makespan       | 60.04 |

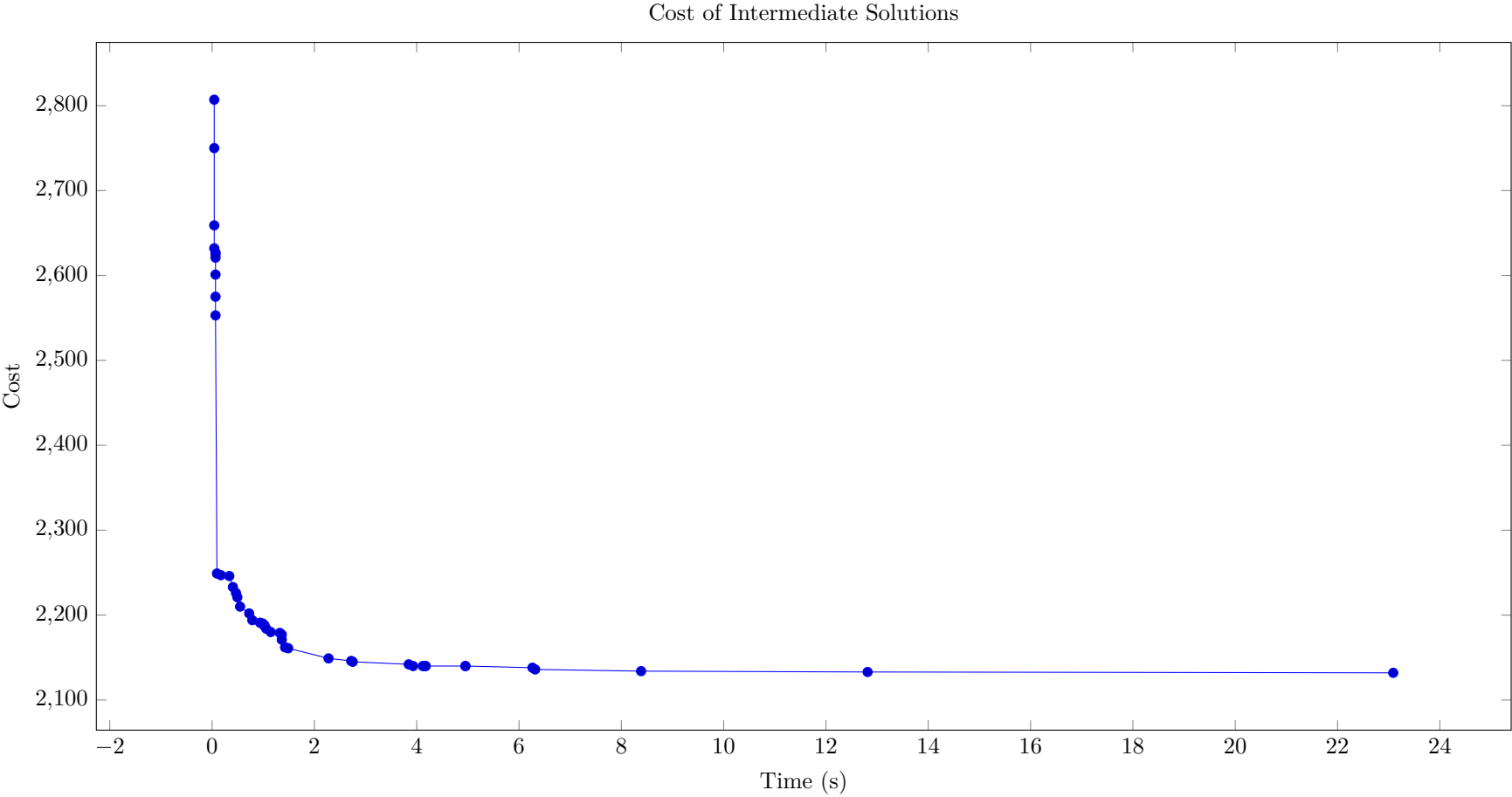
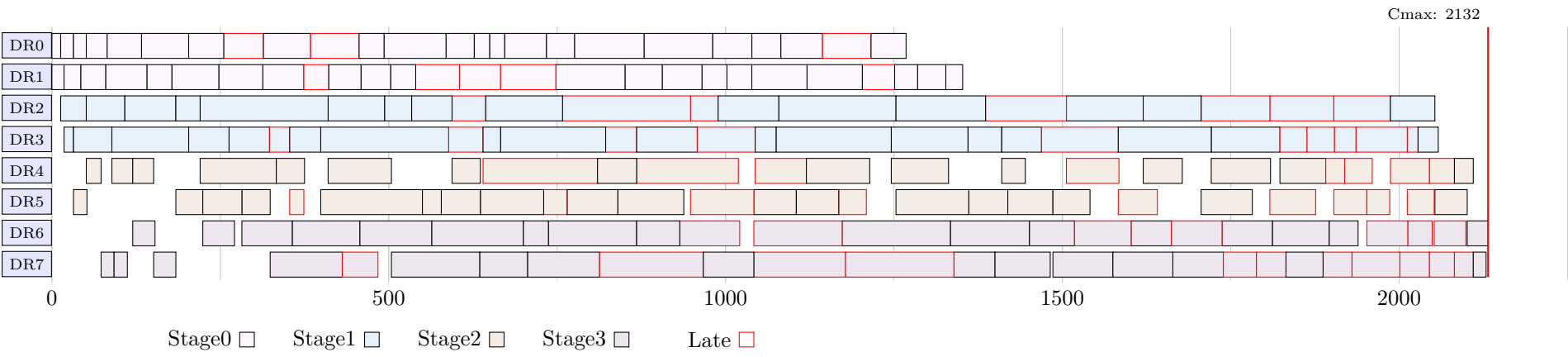


Figure 1: Machine Gantt for Solution Sol3



Resource Utilization for Solution Sol3

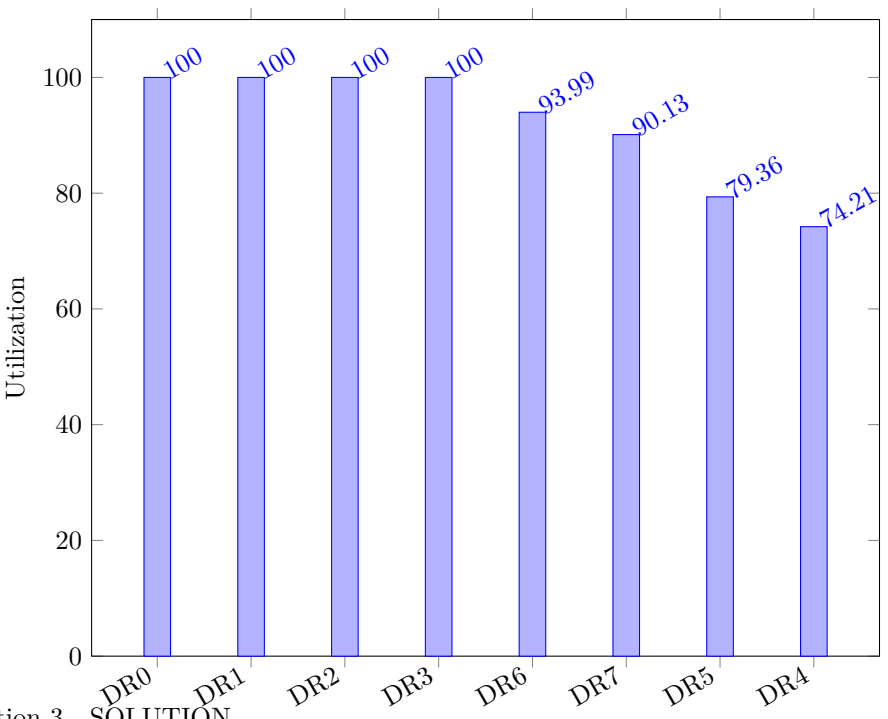


Figure 2: Job Gantt for Solution Sol3 (Part 1 of 2)

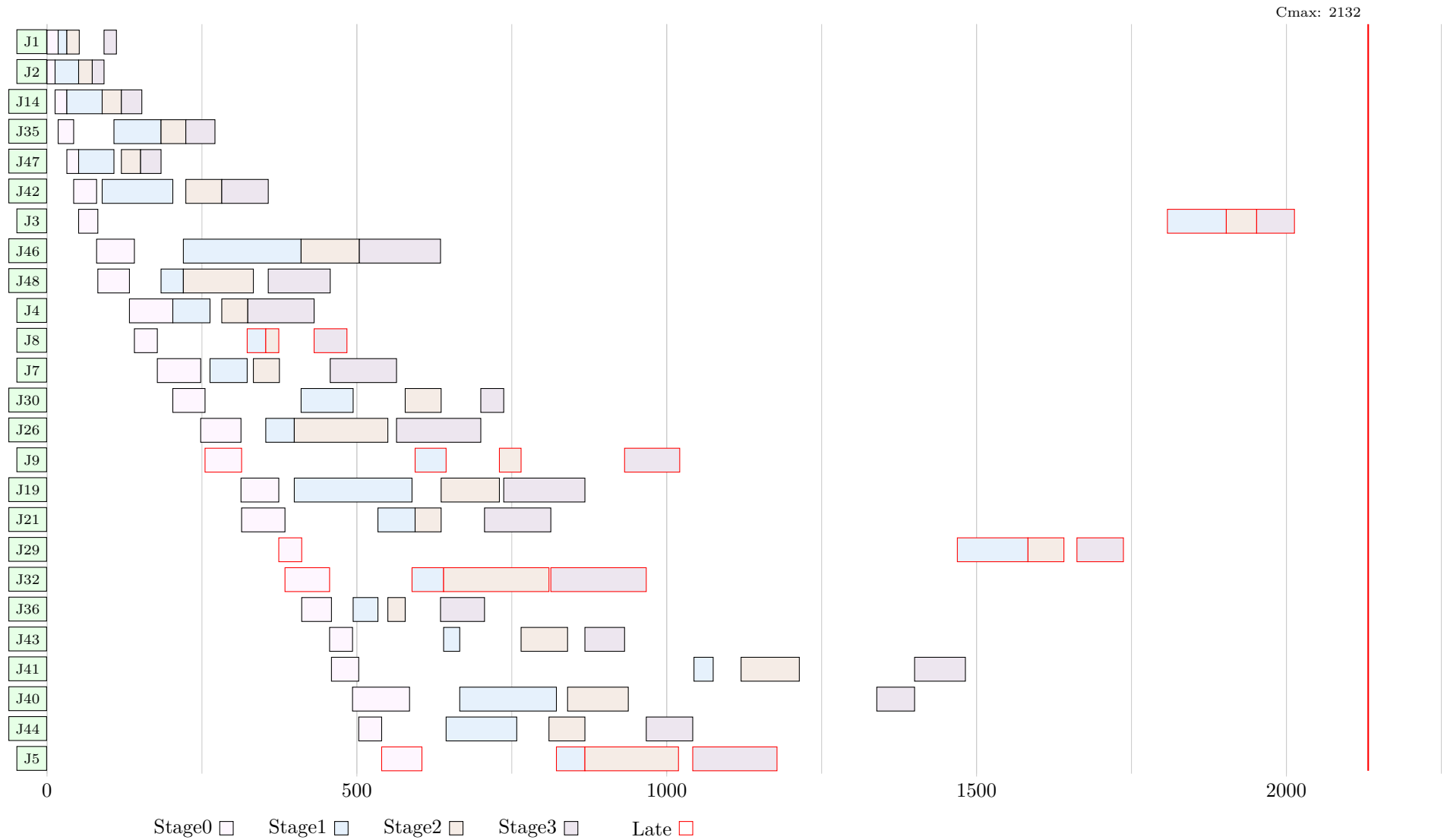


Figure 3: Job Gantt for Solution Sol3 (Part 2 of 2)

