# Scheduling Report

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### Report Generated on October 2, 2024

# 1 Introduction

Table 1: Problem

| Name | Timepoints as Date | Nr Products | Nr Process | Nr Disjunctive Resources | Nr Cumulative Resources | Nr Orders | Nr Jobs | Nr 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 (s) |
|---|---|---|---|---|---|---|---|
| Sol1 | true | false | true | true | true | 2 | 60 |
| Sol2 | true | false | true | true | true | 2 | 60 |
| Sol3 | true | false | true | true | true | 2 | 60 |
| Sol4 | true | false | false | true | true | 2 | 60 |

Table 4: Solutions (Total 4)

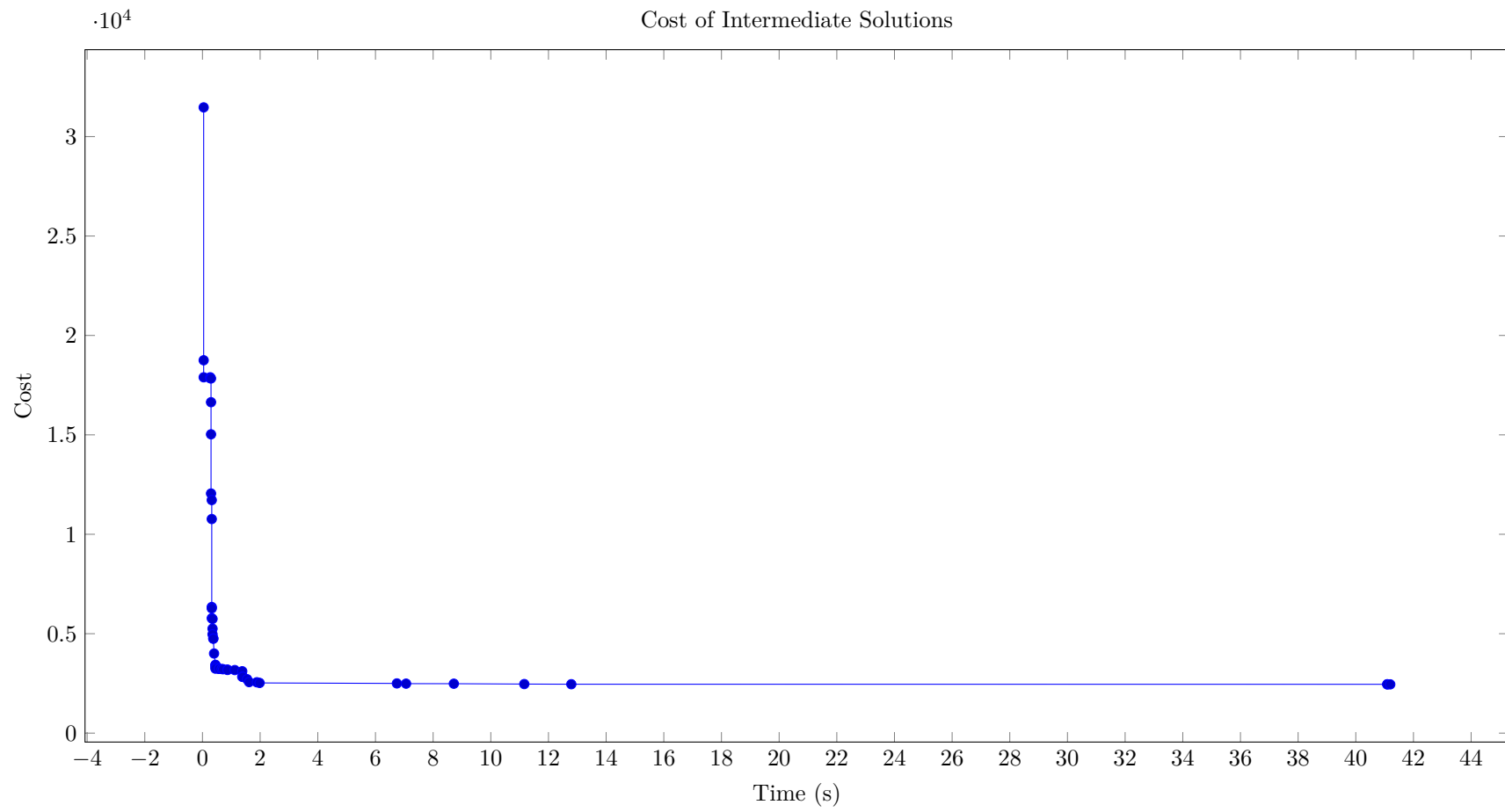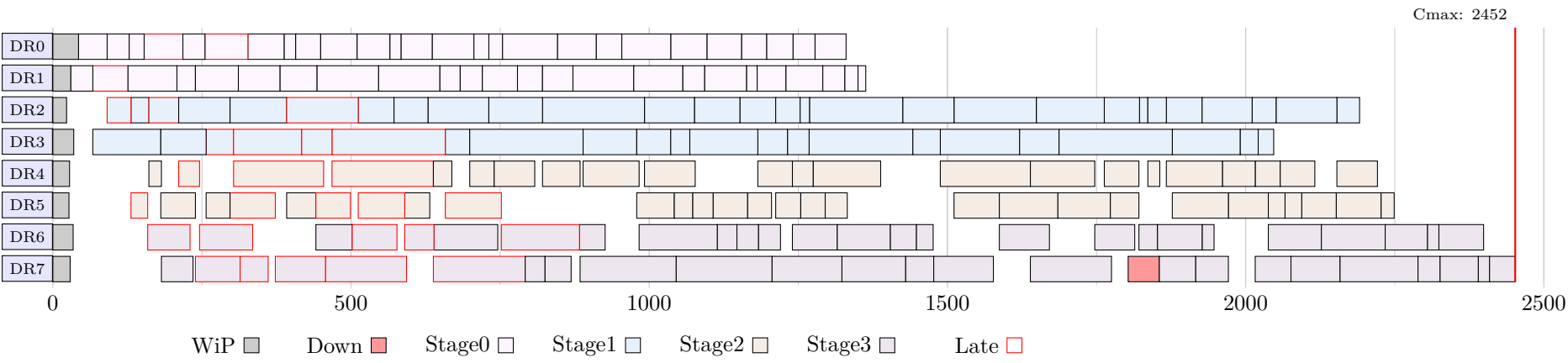| Name | Solver Status | Objective Type | Objective Value | Bound | Gap | Makespan | Flowtime | Total Lateness | Max Lateness | Nr Late | Total Earliness | Max Earliness | Nr Early | Model Type | Time (s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sol1 | Solution | Makespan | 2,649 | 1732.00 | 0.35 | 2,649 | 73,118 | 19,777 | 2,144 | 20 | 30,832 | 2,456 | 30 | CPO | 60.13 |
| Sol2 | Optimal | MaxLateness | 373 | 373.00 | 0.00 | 2,852 | 82,682 | 4,732 | 373 | 22 | 6,223 | 609 | 28 | CPO | 1.89 |
| Sol3 | Solution | TotalLateness | 2,470 | 1125.00 | 0.54 | 2,733 | 78,346 | 2,470 | 633 | 11 | 8,297 | 518 | 39 | CPO | 60.04 |
| Sol4 | Solution | TotalLateness | 2,452 | 1079.00 | 0.56 | 2,452 | 70,011 | 2,452 | 688 | 10 | 16,614 | 677 | 40 | CPO | 60.05 |

Cost of Intermediate Solutions

Figure 1: Machine Gantt for Solution Sol4
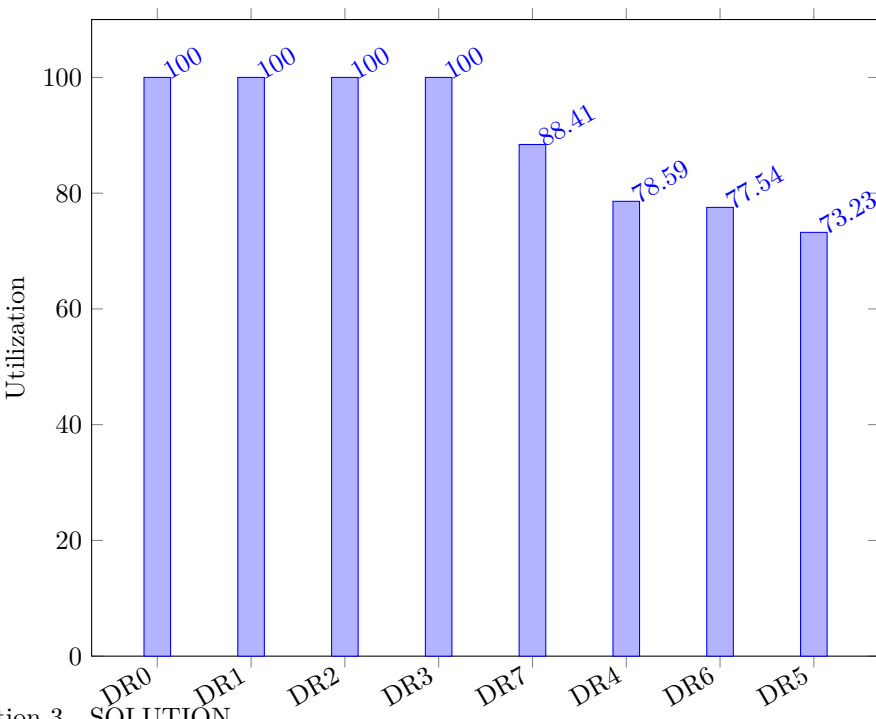


Resource Utilization for Solution Sol4
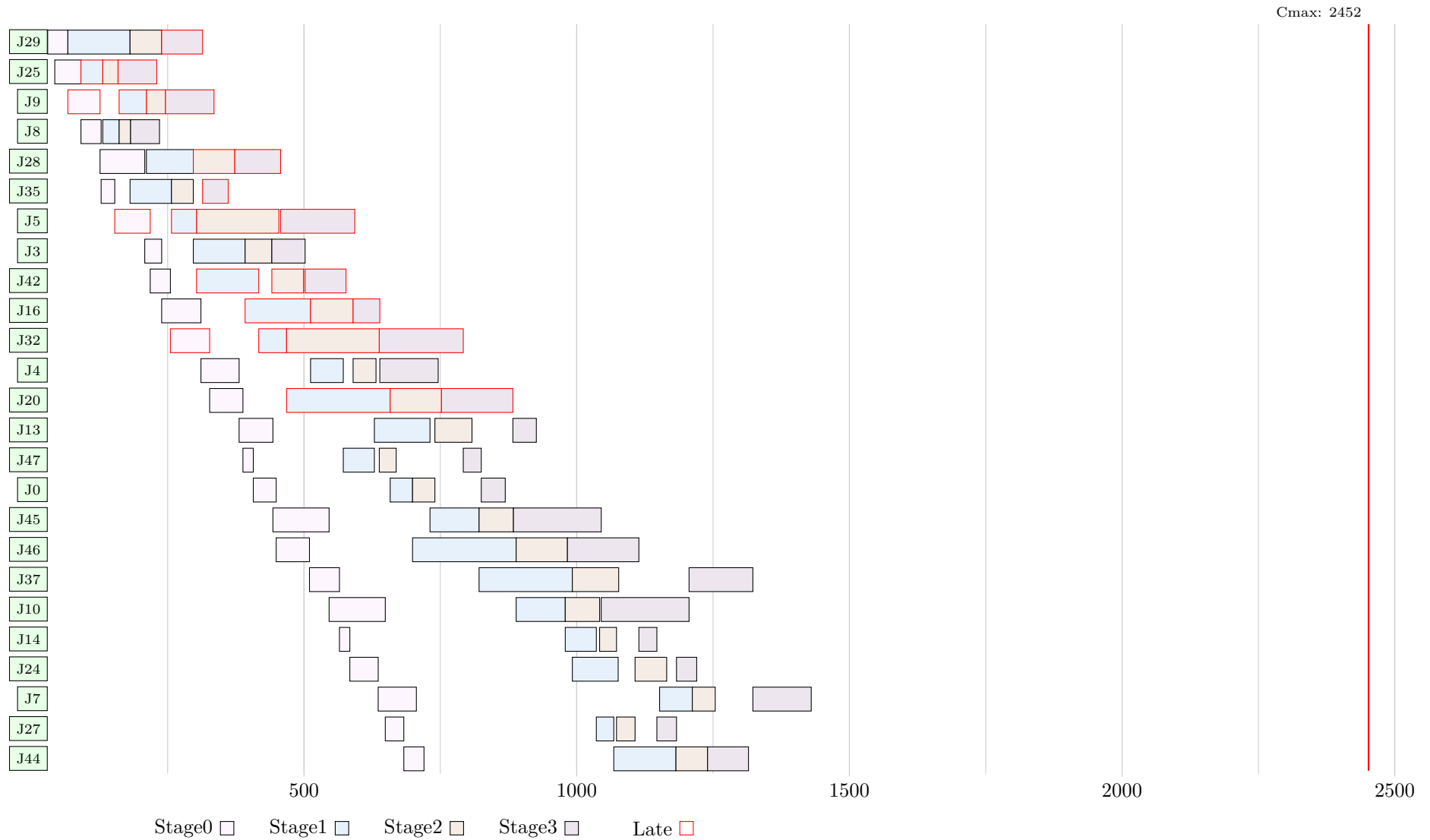
Figure 2: Job Gantt for Solution Sol4 (Part 1 of 2)

Figure 3: Job Gantt for Solution Sol4 (Part 2 of 2)

Cumulative Resource Use CR0

Earliness/Lateness Over Time