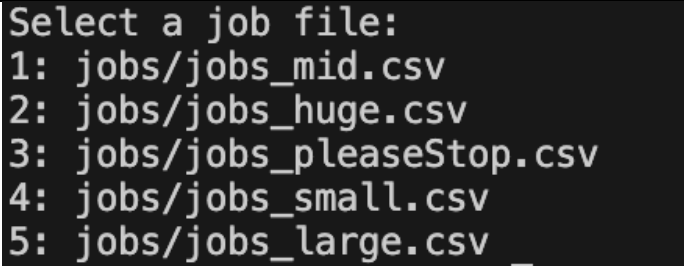
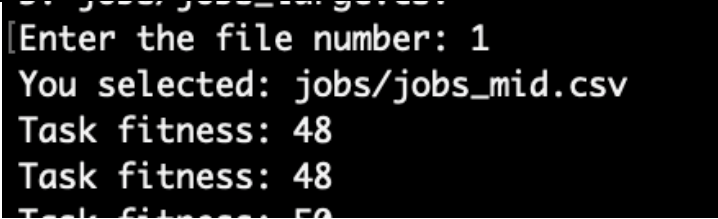
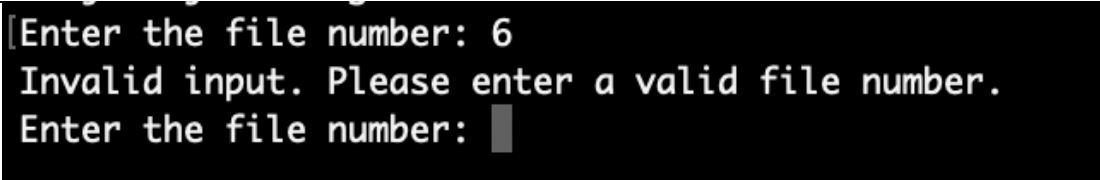


Solution Constraints

- Each operation must start only after the previous one in the sequence is completed.
 - Each machine can handle only one operation at a time.
- The completion time of an operation is the start time plus the processing time.
 - Operations cannot be interrupted once started.

| Test Description | Test Data | Expected Outcome | Success? | Evidence |
|---|--|--|----------|---|
| A list of job files in the jobs directory is displayed in console. | This should be displayed on execution. | A menu displays the jobs with an associated number. | |  <pre> Select a job file: 1: jobs/jobs_mid.csv 2: jobs/jobs_huge.csv 3: jobs/jobs_pleaseStop.csv 4: jobs/jobs_small.csv 5: jobs/jobs_large.csv </pre> |
| User is prompted to select a job file. | User enters the number "1". | The associated job will be selected. | |  <pre> Enter the file number: 1 You selected: jobs/jobs_mid.csv Task fitness: 48 Task fitness: 48 Task fitness: 50 </pre> |
| User selects a non-existent job file — system prompts with error. | Entering "6" into the console when prompted. | The user is alerted that the file doesn't exist and is asked to try again. | |  <pre> Enter the file number: 6 Invalid input. Please enter a valid file number. Enter the file number: </pre> |

The makespan of **all jobs** is displayed clearly.

Generating a schedule associated with 1.

The makespan will be displayed at the top of the schedule output.

Best job fitness: 27

Schedule:

TimeMachiningFabricationST

The **number of jobs** is displayed clearly.

Generating a schedule associated with 1.

The number of jobs will be displayed at the bottom of the schedule.

Number of Jobs

30

The **average time** taken per **job** is displayed clearly.

Generating a schedule associated with 1.

The average time taken per job will be displayed at the bottom of the schedule.

Average Processing Time

2

The **total number of**

Generating a schedule

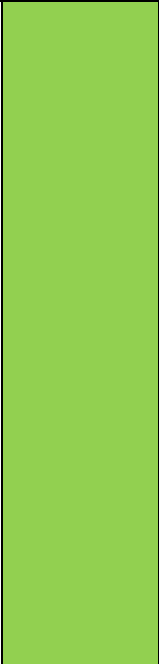
The total number of

| | | | | | | | | | |
|------------|-----------|-------------|----------|-------------------|-----------------|----------|----------|-----------|---------|
| Task Count | 22 | 21 | 30 | 17 | 30 | 6 | 10 | 10 | 6 |
| StartTime | Machining | Fabrication | Assembly | Surface Treatment | Quality Control | Painting | Branding | Packaging | Testing |

A **readable** schedule is printed to the console.

Generating a schedule associated with 1.

A schedule with correct subdivisions and job placement is displayed to user.

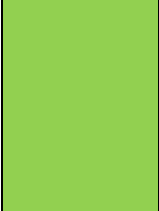


| Time | Machining | Fabrication | ST | Assembly | QC | Testing |
|------|------------|-------------|------------|------------|------------|------------|
| 0 | Job 2 Op 1 | | | | | |
| 1 | | Job 2 Op 2 | | | | |
| 2 | | | | | | |
| 3 | | Job 6 Op 1 | Job 2 Op 3 | | | |
| 4 | | | | Job 2 Op 4 | | |
| 5 | | | | | | |
| 6 | Job 5 Op 1 | | | | | |
| 7 | | | | | | |
| 8 | Job 3 Op 1 | | | Job 6 Op 2 | Job 2 Op 5 | |
| 9 | | | | | | |
| 10 | | Job 5 Op 2 | | | Job 6 Op 3 | |
| 11 | Job 1 Op 1 | | Job 6 Op 4 | | | |
| 12 | | Job 3 Op 2 | Job 5 Op 3 | | | Job 6 Op 5 |
| 13 | Job 4 Op 1 | Job 1 Op 2 | | | | |
| 14 | | | Job 3 Op 3 | | Job 5 Op 4 | |
| 15 | | | | Job 5 Op 5 | Job 3 Op 4 | |
| 16 | | | | | Job 1 Op 3 | |
| 17 | | | | | | |
| 18 | | | | Job 3 Op 5 | | Job 5 Op 6 |
| 19 | | | | | | |
| 20 | | | | | | |
| 21 | | | | Job 1 Op 4 | | Job 3 Op 6 |
| 22 | | | | | | |
| 23 | | | | Job 4 Op 2 | | Job 1 Op 5 |
| 24 | | | | | | |
| 25 | | | | | | |
| 26 | | | Job 4 Op 3 | | | |
| 27 | | | | | Job 4 Op 4 | |
| 28 | | | | | | |
| 29 | | | | | | |

User is prompted to **export** the file to an **XLSX** and **denies** successfully.

Generating a schedule associated with 1, then enter 'n'

Schedule will not be exported.

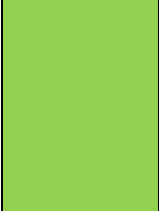


[Do you want to export the schedule to an XLSX file? (y/n): n
Schedule not exported.

User is prompted to **export** the file to an **XLSX** and **accepts** successfully.

Generating a schedule associated with 1, then enter 'y'

A xlsx file will be generated in the codebase.



> tests
📄 job_schedule.xlsx

| | | | | | | | | | |
|---|--------------------------------------|--|--|-------------------|------------------|--------------------|--------------------------|------------------|------------------|
| Schedule output maintains job order. All headers and columns are present and formatted correctly. | Generating a job file schedule | All jobs in output are in the correct order, according to constraints. Schedule headers will be consistent with subdivisions in selected job file. | | Task Count | 3 | 3 | 2 | 3 | 2 |
| | | | | StartTime | Machining | Fabrication | Surface Treatment | Assembly | Testing |
| | | | | 09:00-10:00 | JobID: 2 OpID: 1 | | | | |
| | | | | 10:00-11:00 | | | | | |
| | | | | 11:00-12:00 | JobID: 1 OpID: 1 | JobID: 2 OpID: 2 | | | |
| | | | | 12:00-13:00 | | | JobID: 2 OpID: 3 | | |
| | | | | 13:00-14:00 | | | | | |
| | | | | 14:00-15:00 | JobID: 3 OpID: 1 | JobID: 1 OpID: 2 | | | |
| | | | | 15:00-16:00 | | JobID: 3 OpID: 2 | | | |
| | | | | 16:00-17:00 | | | JobID: 3 OpID: 3 | JobID: 2 OpID: 4 | |
| | | | | 17:00-18:00 | | | | | |
| | | | | 18:00-19:00 | | | | JobID: 1 OpID: 4 | |
| | | | | 19:00-20:00 | | | | | JobID: 1 OpID: 5 |
| | | | | 20:00-21:00 | | | | | |
| | | | | 21:00-22:00 | | | | | |
| | | | | 22:00-23:00 | | | | | |
| | | | | 23:00-00:00 | | | | | JobID: 3 OpID: 6 |
| | | | | 00:00-01:00 | | | | | |
| | | | | End of Schedule | | | | | |

| Schedule output does not have conflicting start times. | Generating a job file schedule | All jobs in same subdivision have different start times, according to constraints. | | <table><tr><th>Time</th><th>Machining</th><th>Fabrication</th><th>ST</th><th>Assembly</th><th>Testing</th></tr><tr><td>0</td><td>Job 2 Op 1</td><td></td><td></td><td></td><td></td></tr><tr><td>1</td><td>Job 1 Op 1</td><td>Job 2 Op 2</td><td></td><td></td><td></td></tr><tr><td>2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>3</td><td>Job 3 Op 1</td><td>Job 1 Op 2</td><td>Job 2 Op 3</td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td>Job 2 Op 4</td><td></td></tr><tr><td>5</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>6</td><td></td><td>Job 3 Op 2</td><td></td><td></td><td></td></tr><tr><td>7</td><td></td><td></td><td>Job 3 Op 3</td><td></td><td></td></tr><tr><td>8</td><td></td><td></td><td></td><td>Job 1 Op 4</td><td></td></tr><tr><td>9</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>10</td><td></td><td></td><td></td><td></td><td>Job 1 Op 5</td></tr><tr><td>11</td><td></td><td></td><td></td><td>Job 3 Op 5</td><td></td></tr><tr><td>12</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>13</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>14</td><td></td><td></td><td></td><td></td><td>Job 3 Op 6</td></tr><tr><td>15</td><td></td><td></td><td></td><td></td><td></td></tr></table> | Time | Machining | Fabrication | ST | Assembly | Testing | 0 | Job 2 Op 1 | | | | | 1 | Job 1 Op 1 | Job 2 Op 2 | | | | 2 | | | | | | 3 | Job 3 Op 1 | Job 1 Op 2 | Job 2 Op 3 | | | 4 | | | | Job 2 Op 4 | | 5 | | | | | | 6 | | Job 3 Op 2 | | | | 7 | | | Job 3 Op 3 | | | 8 | | | | Job 1 Op 4 | | 9 | | | | | | 10 | | | | | Job 1 Op 5 | 11 | | | | Job 3 Op 5 | | 12 | | | | | | 13 | | | | | | 14 | | | | | Job 3 Op 6 | 15 | | | | | |
|--|---------------------------------------|--|------------|---|------------|-----------|-------------|----|----------|---------|---|------------|--|--|--|--|---|------------|------------|--|--|--|---|--|--|--|--|--|---|------------|------------|------------|--|--|---|--|--|--|------------|--|---|--|--|--|--|--|---|--|------------|--|--|--|---|--|--|------------|--|--|---|--|--|--|------------|--|---|--|--|--|--|--|----|--|--|--|--|------------|----|--|--|--|------------|--|----|--|--|--|--|--|----|--|--|--|--|--|----|--|--|--|--|------------|----|--|--|--|--|--|
| Time | Machining | Fabrication | ST | Assembly | Testing | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | Job 2 Op 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Job 1 Op 1 | Job 2 Op 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Job 3 Op 1 | Job 1 Op 2 | Job 2 Op 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | Job 2 Op 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | Job 3 Op 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | Job 3 Op 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | Job 1 Op 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | Job 1 Op 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | Job 3 Op 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | | | | | Job 3 Op 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| System can handle larger (100+ lines) jobs within a reasonable time. | Loading in a job file with 155 lines. | A valid schedule will be generated in <= 2 seconds. | | <div>Elapsed time: 924 ms (0.9249595 seconds)</div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Schedule
output is
readable
even with
larger files
(Console)

Generating
a schedule
for a job
file with
153 lines.

The console
output can
accommodate
for additional
headings and
data.

| Time | Fabrication | ST | Assembly | Machining | QC | Branding | Painting | Testing | Packaging |
|------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 0 | Job 19 Op 1 | | | | | | | | |
| 1 | Job 6 Op 1 | Job 19 Op 2 | | | | | | | |
| 2 | | | | | | | | | |
| 3 | | | Job 19 Op 3 | | | | | | |
| 4 | | Job 6 Op 2 | | Job 18 Op 1 | | | | | |
| 5 | | | | Job 16 Op 1 | Job 19 Op 4 | | Job 19 Op 5 | | |
| 6 | | | Job 18 Op 2 | Job 4 Op 1 | | | | | |
| 7 | | | | | | | | | |
| 8 | | | | | | | | | |
| 9 | | | | | | | | | |
| 10 | | | | Job 28 Op 1 | | | | | |
| 11 | | | Job 16 Op 2 | | | | | | |
| 12 | | | Job 11 Op 1 | | | | | | |
| 13 | | | Job 4 Op 2 | | | | | | |
| 14 | | | | Job 14 Op 1 | | | | | |
| 15 | | | | | | | | | |
| 16 | | | Job 28 Op 2 | Job 25 Op 1 | | | | | |
| 17 | | | | | | | | | |
| 18 | | | Job 20 Op 1 | | | | | | |
| 19 | Job 11 Op 2 | | Job 6 Op 3 | | | | | | |
| 20 | | | | | | | | | |
| 21 | | | Job 14 Op 2 | Job 8 Op 1 | Job 18 Op 3 | | | | |
| 22 | | | | | Job 16 Op 3 | | | | |
| 23 | | Job 4 Op 3 | | | Job 6 Op 4 | | | | |
| 24 | | | Job 25 Op 2 | Job 7 Op 1 | Job 28 Op 3 | | Job 18 Op 4 | Job 6 Op 5 | |
| 25 | | | | | | | | | |
| 26 | Job 20 Op 2 | | Job 11 Op 3 | Job 12 Op 1 | | | | | |
| 27 | | | | | | Job 16 Op 4 | | | |
| 28 | Job 8 Op 2 | | | | | | | | |
| 29 | | | Job 7 Op 2 | Job 27 Op 1 | | | | | |
| 30 | | | | Job 24 Op 1 | | | | | |
| 31 | | | | | Job 14 Op 3 | | | | |
| 32 | Job 12 Op 2 | Job 20 Op 3 | | | Job 25 Op 3 | | | | |
| 33 | Job 27 Op 2 | Job 8 Op 3 | | Job 9 Op 1 | Job 4 Op 4 | | | | |
| 34 | | | | Job 1 Op 1 | | | | | |
| 35 | Job 29 Op 1 | Job 12 Op 3 | | | Job 11 Op 4 | | | | |
| 36 | | | | | | | | | |
| 37 | | Job 27 Op 3 | | | | | | | |
| 38 | Job 24 Op 2 | | | | | Job 25 Op 4 | | | |
| 39 | | Job 9 Op 2 | Job 20 Op 4 | | | | | | Job 11 Op 5 |
| 40 | | | | | | Job 4 Op 6 | | | |
| 41 | | Job 24 Op 3 | | Job 21 Op 1 | | | | | |
| 42 | | | Job 9 Op 3 | | Job 20 Op 5 | | | | |
| 43 | Job 26 Op 1 | | | | | | | | |
| 44 | Job 22 Op 1 | | | | | | | | |
| 45 | | | | | | | | | |
| 46 | | | Job 8 Op 4 | | | | | | |
| 47 | Job 17 Op 1 | | | | | | | | |
| 48 | | | | | | | | | |
| 49 | | | | | | | | | |
| 50 | Job 15 Op 1 | | Job 12 Op 4 | | Job 7 Op 4 | Job 8 Op 5 | | | |
| 51 | | | | | | | | | |
| 52 | Job 1 Op 2 | | | | Job 8 Op 6 | | | | Job 7 Op 5 |
| 53 | | | | | | | | | |
| 54 | | | | Job 30 Op 1 | | | | | |
| 55 | | Job 29 Op 2 | | Job 23 Op 1 | Job 12 Op 5 | | | | |
| 56 | Job 10 Op 1 | | Job 29 Op 3 | Job 2 Op 1 | Job 1 Op 3 | Job 12 Op 6 | | | |
| 57 | | | | | | | | | |
| 58 | Job 3 Op 2 | | | Job 13 Op 1 | | | | | |
| 59 | Job 21 Op 2 | | | Job 5 Op 1 | | | | | |
| 60 | | Job 26 Op 2 | Job 27 Op 4 | | | | | | |
| 61 | | | | | | | | | |
| 62 | | Job 22 Op 2 | | | | | | | |
| 63 | | | Job 24 Op 4 | | Job 27 Op 5 | | | | |
| 64 | | Job 17 Op 2 | | | | | | | |
| 65 | | | | | | | | | |
| 66 | | Job 15 Op 2 | | | | | | | |
| 67 | | Job 3 Op 3 | Job 30 Op 2 | | Job 9 Op 4 | | | | |
| 68 | | | | | Job 24 Op 5 | | | | |
| 69 | | | | | | | | | |
| 70 | Job 23 Op 2 | | Job 21 Op 3 | | | Job 24 Op 6 | Job 9 Op 5 | | |
| 71 | | | | | | | | | |
| 72 | Job 2 Op 2 | | | | | | | | |
| 73 | | | | | | | | | |
| 74 | | | Job 10 Op 2 | | | | | | |
| 75 | | | | | | | | | |
| 76 | | | | | | | | | |
| 77 | Job 13 Op 2 | | Job 26 Op 3 | | | | | | |
| 78 | | | | | | | | | |
| 79 | Job 5 Op 2 | | | | | | | | |
| 80 | | | | | | | | | |
| 81 | | | Job 22 Op 3 | | | | | | |
| 82 | | | | | | | | | |
| 83 | | | | | | | | | |
| 84 | | | | | | | | | |
| 85 | | | Job 17 Op 3 | | | | | | |
| 86 | | | | | | | | | |
| 87 | | | | | | | | | |
| 88 | | | Job 15 Op 3 | | | | | | |
| 89 | | | | | | | | | |
| 90 | | | | | | | | | |
| 91 | | | | | | | | | |
| 92 | | | | Job 23 Op 3 | Job 30 Op 3 | | | | |
| 93 | | | | | | | | | |
| 94 | | | | | | | | | |
| 95 | | Job 2 Op 3 | Job 1 Op 4 | | | | | | |
| 96 | | | | | | | | | |
| 97 | | | | | Job 10 Op 3 | | | | |
| 98 | | Job 13 Op 3 | | | Job 29 Op 4 | | | Job 1 Op 5 | |
| 99 | | | Job 5 Op 3 | | Job 3 Op 4 | | | | Job 1 Op 6 |
| 100 | | | | | Job 21 Op 4 | | | | |
| 101 | | | | | | | | | |
| 102 | | | Job 3 Op 5 | | Job 26 Op 4 | | | | |
| 103 | | | | | Job 22 Op 4 | | | | |
| 104 | | | | | Job 17 Op 4 | | | | |
| 105 | | | | | Job 15 Op 4 | | | | |
| 106 | | | | | | Job 30 Op 4 | | Job 21 Op 5 | |
| 107 | | | | | | | Job 26 Op 5 | Job 26 Op 5 | |
| 108 | | | | | | | Job 3 Op 6 | | |
| 109 | | | | | | | | | Job 21 Op 6 |
| 110 | | | Job 2 Op 4 | | Job 23 Op 4 | Job 22 Op 5 | | | |
| 111 | | | | | | | | | Job 17 Op 5 |
| 112 | | | | | | | | | Job 3 Op 7 |
| 113 | | | | | | | Job 10 Op 4 | | |
| 114 | | | | | | | | | |
| 115 | | | Job 13 Op 4 | | | | Job 15 Op 5 | | |
| 116 | | | | | | | | | |
| 117 | | | | | | | | | |
| 118 | | | | | Job 5 Op 4 | | | | Job 23 Op 5 |
| 119 | | | | | | | | | |
| 120 | | | | | Job 2 Op 5 | | | | |

Console and Spreadsheet data matches.

4

Both outputs have matching content.

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG | AH | AI | AJ | AK | AL | AM | AN | AO | AP | AQ | AR | AS | AT | AU | AV | AW | AX | AY | AZ | BA | BB | BC | BD | BE | BF | BG | BH | BI | BJ | BK | BL | BM | BN | BO | BP | BQ | BR | BS | BT | BU | BV | BW | BX | BY | BZ | CA | CB | CC | CD | CE | CF | CG | CH | CI | CJ | CK | CL | CM | CN | CO | CP | CQ | CR | CS | CT | CU | CV | CW | CX | CY | CZ | DA | DB | DC | DD | DE | DF | DG | DH | DI | DJ | DK | DL | DM | DN | DO | DP | DQ | DR | DS | DT | DU | DV | DW | DX | DY | DZ | EA | EB | EC | ED | EE | EF | EG | EH | EI | EJ | EK | EL | EM | EN | EO | EP | EQ | ER | ES | ET | EU | EV | EW | EX | EY | EZ | FA | FB | FC | FD | FE | FF | FG | FH | FI | FJ | FK | FL | FM | FN | FO | FP | FQ | FR | FS | FT | FU | FV | FW | FX | FY | FZ | GA | GB | GC | GD | GE | GF | GG | GH | GI | GJ | GK | GL | GM | GN | GO | GP | GQ | GR | GS | GT | GU | GV | GW | GX | GY | GZ | HA | HB | HC | HD | HE | HF | HG | HH | HI | HJ | HK | HL | HM | HN | HO | HP | HQ | HR | HS | HT | HU | HV | HW | HX | HY | HZ | IA | IB | IC | ID | IE | IF | IG | IH | II | IJ | IK | IL | IM | IN | IO | IP | IQ | IR | IS | IT | IU | IV | IW | IX | IY | IZ | JA | JB | JC | JD | JE | JF | JG | JH | JI | IJ | JK | JL | JM | JN | JO | JP | JQ | JR | JS | JT | JU | JV | JW | JX | JY | JZ | KA | KB | KC | KD | KE | KF | KG | KH | KI | KJ | KK | KL | KM | KN | KO | KP | KQ | KR | KS | KT | KU | KV | KW | KX | KY | KZ | LA | LB | LC | LD | LE | LF | LG | LH | LI | LJ | LK | LL | LM | LN | LO | LP | LQ | LR | LS | LT | LU | LV | LW | LX | LY | LZ | MA | MB | MC | MD | ME | MF | MG | MH | MI | MJ | MK | ML | MM | MN | MO | MP | MQ | MR | MS | MT | MU | MV | MW | MX | MY | MZ | NA | NB | NC | ND | NE | NF | NG | NH | NI | NJ | NK | NL | NM | NN | NO | NP | NQ | NR | NS | NT | NU | NV | NW | NX | NY | NZ | OA | OB | OC | OD | OE | OF | OG | OH | OI | OJ | OK | OL | OM | ON | OO | OP | OQ | OR | OS | OT | OU | OV | OW | OX | OY | OZ | PA | PB | PC | PD | PE | PF | PG | PH | PI | PJ | PK | PL | PM | PN | PO | PP | PQ | PR | PS | PT | PU | PV | PW | PX | PY | PZ | QA | QB | QC | QD | QE | QF | QG | QH | QI | QJ | QK | QL | QM | QN | QO | QP | QQ | QR | QS | QT | QU | QV | QW | QX | QY | QZ | RA | RB | RC | RD | RE | RF | RG | RH | RI | RJ | RK | RL | RM | RN | RO | RP | RQ | RR | RS | RT | RU | RV | RW | RX | RY | RZ | SA | SB | SC | SD | SE | SF | SG | SH | SI | SJ | SK | SL | SM | SN | SO | SP | SQ | SR | SS | ST | SU | SV | SW | SX | SY | SZ | TA | TB | TC | TD | TE | TF | TG | TH | TI | TJ | TK | TL | TM | TN | TO | TP | TQ | TR | TS | TT | TU | TV | TW | TX | TY | TZ | UA | UB | UC | UD | UE | UF | UG | UH | UI | UJ | UK | UL | UM | UN | UO | UP | UQ | UR | US | UT | UU | UV | UW | UX | UY | UZ | VA | VB | VC | VD | VE | VF | VG | VH | VI | VJ | VK | VL | VM | VN | VO | VP | VQ | VR | VS | VT | VU | VV | VW | VX | VY | VZ | WA | WB | WC | WD | WE | WF | WG | WH | WI | WJ | WK | WL | WM | WN | WO | WP | WQ | WR | WS | WT | WU | WV | WW | WX | WY | WZ | XA | XB | XC | XD | XE | XF | YG | YH | YI | YJ | YK | YL | YM | YN | YO | YP | YQ | YR | YS | YT | YU | YV | YW | YX | YY | YZ | ZA | ZB | ZC | ZD | ZE | ZF | ZG | ZH | ZI | ZJ | ZK | ZL | ZM | ZN | ZO | ZP | ZQ | ZR | ZS | ZT | ZU | ZV | ZW | ZX | ZY | ZZ | AA | AB | AC |
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