

# OUTPUT:

```
server.c - p1 - Visual Studio Code
File Edit Selection View Go Run Terminal Help
EXPLORER
p1
  client.c
  client.o
  p1.exe
  p1.mk
  server.c
  server.h
  server.h.gch
  server.o
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
PS C:\Users\Admin\Desktop\p1> make -f p1.mk
gcc -c server.c server.h
gcc -c client.c server.h
PS C:\Users\Admin\Desktop\p1> .\p1
1
Program that simulates an airport with only one runway.
One plane can land or depart in each unit of time.
Up to 5 planes can be waiting to land or take off at any time.
How many units of time will the simulation run?30

Expected number of arrivals per unit time? 0.47
Expected number of departures per unit time? 0.47

Plane 1 ready to take off.

Queue is empty.
1: Plane 0 took off in queue 1 units

Queue is empty.
2: Plane 0 took off in queue 2 units

Plane 2 ready to land.

Plane 3 ready to take off.
3: Plane 2 landed in queue 0 units

Plane 4 ready to land.
4: Plane 4 landed in queue 0 units

Queue is empty.
5: Plane 0 took off in queue 5 units

Plane 5 ready to take off.

Plane 6 ready to take off.

Queue is empty.
6: Plane 0 took off in queue 6 units

Plane 7 ready to land.

Plane 8 ready to land.
7: Plane 7 landed in queue 0 units
8: Plane 8 landed in queue 1 units

Ln 127, Col 21 Spacing: 4 UTF-8 CRLF C Go Live Win32 21:31 25-05-2020

server.c - p1 - Visual Studio Code
File Edit Selection View Go Run Terminal Help
EXPLORER
p1
  client.c
  client.o
  p1.exe
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  server.h
  server.h.gch
  server.o
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
8: Plane 8 landed in queue 1 units

Plane 9 ready to land.

Plane 10 ready to take off.
9: Plane 9 landed in queue 0 units

Plane 11 ready to land.

Plane 12 ready to take off.
plane 12 told to try later.
10: Plane 11 landed in queue 0 units

Queue is empty.
11: Plane 0 took off in queue 11 units

Plane 13 ready to land.
12: Plane 13 landed in queue 0 units

Queue is empty.
13: Plane 0 took off in queue 13 units

Plane 14 ready to land.
14: Plane 14 landed in queue 0 units

Plane 15 ready to land.

Plane 16 ready to land.

Plane 17 ready to land.

Plane 18 ready to take off.
plane 18 told to try later.

Plane 19 ready to take off.
plane 19 told to try later.
15: Plane 15 landed in queue 0 units

Plane 20 ready to land.
16: Plane 16 landed in queue 1 units

Plane 21 ready to take off.
plane 21 told to try later.
17: Plane 17 landed in queue 2 units

Plane 22 ready to take off.

Ln 127, Col 21 Spacing: 4 UTF-8 CRLF C Go Live Win32 21:31 25-05-2020
```

The image displays two sequential screenshots of a Visual Studio Code terminal window, showing the output of a simulation. The terminal is titled "server.c - p1 - Visual Studio Code" and has a PowerShell prompt "z: powershell".

**Top Screenshot:** The terminal shows the first 28 lines of the simulation log. The Explorer panel on the left lists files: client.c, client.o, p1.exe, p1.mk, server.c, server.h, server.h.gch, and server.o. The Output panel shows the following log entries:

```
Plane 22 ready to take off.  
plane 22 told to try later.  
18: Plane 20 landed in queue 2 units  
Queue is empty.  
19: Plane 0 took off in queue 19 units  
Plane 23 ready to land.  
20: Plane 23 landed in queue 0 units  
Plane 24 ready to land.  
Plane 25 ready to land.  
Plane 26 ready to take off.  
plane 26 told to try later.  
21: Plane 24 landed in queue 0 units  
22: Plane 25 landed in queue 1 units  
Plane 27 ready to land.  
23: Plane 27 landed in queue 0 units  
Queue is empty.  
24: Plane 0 took off in queue 24 units  
Queue is empty.  
25: Plane 0 took off in queue 25 units  
Plane 28 ready to take off.  
plane 28 told to try later.  
Queue is empty.  
26: Plane 0 took off in queue 26 units  
Plane 29 ready to land.  
27: Plane 29 landed in queue 0 units  
Plane 30 ready to take off.  
plane 30 told to try later.  
Plane 31 ready to take off.  
plane 31 told to try later.  
Queue is empty.  
28: Plane 0 took off in queue 28 units
```

**Bottom Screenshot:** The terminal shows the final 12 lines of the simulation log, including simulation statistics. The log entries are:

```
Plane 27 ready to land.  
23: Plane 27 landed in queue 0 units  
Queue is empty.  
24: Plane 0 took off in queue 24 units  
Queue is empty.  
25: Plane 0 took off in queue 25 units  
Plane 28 ready to take off.  
plane 28 told to try later.  
Queue is empty.  
26: Plane 0 took off in queue 26 units  
Plane 29 ready to land.  
27: Plane 29 landed in queue 0 units  
Plane 30 ready to take off.  
plane 30 told to try later.  
Plane 31 ready to take off.  
plane 31 told to try later.  
Queue is empty.  
28: Plane 0 took off in queue 28 units  
Queue is empty.  
29: Plane 0 took off in queue 29 units  
Queue is empty.  
30: Plane 0 took off in queue 30 units  
Simulation has concluded after 30 units.  
Total number of planes processed: 31  
Number of planes landed: 17  
Number of planes taken off: 13  
Number of planes refused use: 9  
Number left ready to land: 0  
Number left ready to take off: 5  
Percentage of time runway idle: 0.000000  
Average wait time to land: 0.411765  
Average wait time to take off: 16.846154
```

The status bar at the bottom of the terminal window indicates "Ln 127, Col 21", "Spaces: 4", "UTF-8", "CRLF", "Go Live", "Win32", and the date "25-05-2020".

The image displays two sequential screenshots of a Visual Studio Code terminal window, showing the execution of a C program that simulates an airport runway. The terminal output is as follows:

**Terminal Output (First Screenshot):**

```
PS C:\Users\Admin\Desktop\p1> make -f p1.mk
gcc -c server.c server.h
PS C:\Users\Admin\Desktop\p1> ./p1
1
Program that simulates an airport with only one runway.
One plane can land or depart in each unit of time.
Up to 5 planes can be waiting to land or take off at any time.
How many units of time will the simulation run? 30

Expected number of arrivals per unit time? 0.47
Expected number of departures per unit time? 0.47
1: Runway is idle.
2: Runway is idle.

Plane 1 ready to land.
3:Plane 1 landed in queue 0 units
Plane 2 ready to take off.
Queue is empty.
4:Plane 0 took off in queue 4 units
Plane 3 ready to land.
Plane 4 ready to take off.
Plane 5 ready to take off.
5:Plane 3 landed in queue 0 units
Plane 6 ready to take off.
Plane 7 ready to take off.
Queue is empty.
6:Plane 0 took off in queue 6 units
Queue is empty.
7:Plane 0 took off in queue 7 units
Plane 8 ready to land.
8:Plane 8 landed in queue 0 units
Queue is empty.
9:Plane 0 took off in queue 9 units
```

**Terminal Output (Second Screenshot):**

```
9:Plane 0 took off in queue 9 units
Plane 9 ready to land.
10:Plane 9 landed in queue 0 units
Plane 10 ready to land.
11:Plane 10 landed in queue 0 units
Plane 11 ready to take off.
plane 11 told to try later.
Queue is empty.
12:Plane 0 took off in queue 12 units
Plane 12 ready to land.
Plane 13 ready to take off.
plane 13 told to try later.
Plane 14 ready to take off.
plane 14 told to try later.
13:Plane 12 landed in queue 0 units
Queue is empty.
14:Plane 0 took off in queue 14 units
Queue is empty.
15:Plane 0 took off in queue 15 units
Plane 15 ready to take off.
plane 15 told to try later.
Queue is empty.
16:Plane 0 took off in queue 16 units
Queue is empty.
17:Plane 0 took off in queue 17 units
Queue is empty.
18:Plane 0 took off in queue 18 units
Queue is empty.
19:Plane 0 took off in queue 19 units
Plane 16 ready to land.
```

The image displays two sequential screenshots of a Visual Studio Code terminal window, showing the output of a simulation. The terminal is titled "client.c - p1 - Visual Studio Code" and has a "powershell" session selected. The Explorer sidebar on the left shows a project structure with files like client.c, client.o, client.zip, p1.exe, p1.mk, p1.zip, server.c, server.h, server.hgch, server.o, and server.zip. The Output/Debug Console tab is active, displaying the simulation's progress.

**First Screenshot (Top):** The simulation output shows the following sequence of events:

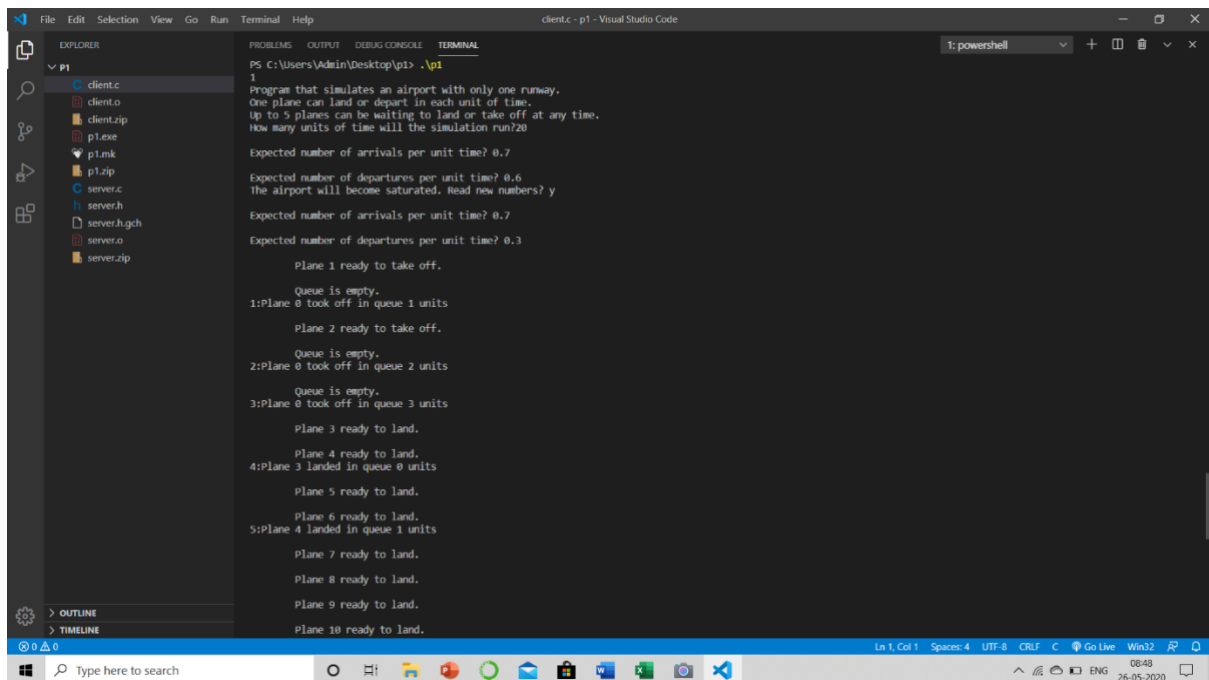
- Plane 16 ready to land.
- Plane 17 ready to land.
- 20:Plane 16 landed in queue 0 units
- Plane 18 ready to take off.
- plane 18 told to try later.
- Plane 19 ready to take off.
- plane 19 told to try later.
- 21:Plane 17 landed in queue 1 units
- Plane 20 ready to take off.
- plane 20 told to try later.
- Queue is empty.
- 22:Plane 0 took off in queue 22 units
- Queue is empty.
- 23:Plane 0 took off in queue 23 units
- Plane 21 ready to land.
- 24:Plane 21 landed in queue 0 units
- Plane 22 ready to take off.
- plane 22 told to try later.
- Queue is empty.
- 25:Plane 0 took off in queue 25 units
- Plane 23 ready to take off.
- plane 23 told to try later.
- Queue is empty.
- 26:Plane 0 took off in queue 26 units
- Plane 24 ready to take off.
- plane 24 told to try later.
- Queue is empty.
- 27:Plane 0 took off in queue 27 units
- Queue is empty.
- 28:Plane 0 took off in queue 28 units

**Second Screenshot (Bottom):** The simulation continues with the following sequence of events:

- Queue is empty.
- 23:Plane 0 took off in queue 23 units
- Plane 21 ready to land.
- 24:Plane 21 landed in queue 0 units
- Plane 22 ready to take off.
- plane 22 told to try later.
- Queue is empty.
- 25:Plane 0 took off in queue 25 units
- Plane 23 ready to take off.
- plane 23 told to try later.
- Queue is empty.
- 26:Plane 0 took off in queue 26 units
- Plane 24 ready to take off.
- plane 24 told to try later.
- Queue is empty.
- 27:Plane 0 took off in queue 27 units
- Queue is empty.
- 28:Plane 0 took off in queue 28 units
- Plane 25 ready to take off.
- plane 25 told to try later.
- Queue is empty.
- 29:Plane 0 took off in queue 29 units
- Plane 26 ready to land.
- 30:Plane 26 landed in queue 0 units
- Simulation has concluded after 30 units.
- Total number of planes processed: 26
- Number of planes landed: 10
- Number of planes taken off: 18
- Number of planes refused use: 11
- Number left ready to land: 0
- Number left ready to take off: 5
- Percentage of time runway idle: 6.666667
- Average wait time to land: 0.100000
- Average wait time to take off: 17.611111

The terminal window at the bottom shows the command prompt "PS C:\Users\Admin\Desktop\p1>" and the status bar indicates "Ln 1, Col 1", "Spaces: 4", "UTF-8", "CRLF", "C", "Go Live", "Win32", and the date "26-05-2020".

when sum of expected arrival and departure is  
>1:



```
client.c - p1 - Visual Studio Code
1: powershell
PS C:\Users\Admin\Desktop\p1> .\p1
1
Program that simulates an airport with only one runway.
One plane can land or depart in each unit of time.
Up to 5 planes can be waiting to land or take off at any time.
How many units of time will the simulation run?20

Expected number of arrivals per unit time? 0.7
Expected number of departures per unit time? 0.6
The airport will become saturated. Read new numbers? y

Expected number of arrivals per unit time? 0.7
Expected number of departures per unit time? 0.3

Plane 1 ready to take off.
Queue is empty.
1:Plane 0 took off in queue 1 units

Plane 2 ready to take off.
Queue is empty.
2:Plane 0 took off in queue 2 units

Plane 3 ready to land.
Queue is empty.
3:Plane 0 took off in queue 3 units

Plane 3 ready to land.
Plane 4 ready to land.
4:Plane 3 landed in queue 0 units

Plane 5 ready to land.
Plane 6 ready to land.
5:Plane 4 landed in queue 1 units

Plane 7 ready to land.
Plane 8 ready to land.
Plane 9 ready to land.
Plane 10 ready to land.
```

The image displays two screenshots of a Visual Studio Code terminal window, showing the output of a simulation. The terminal is running a PowerShell script, and the output is displayed in the terminal pane. The Explorer pane on the left shows the project structure, including files like client.c, client.o, client.zip, p.exe, p.mk, p.zip, server.c, server.h, server.hgch, server.o, and server.zip.

**Terminal Output (Top Screenshot):**

```
Plane 10 ready to land.  
plane 10 directed to another airport.  
6:Plane 5 landed in queue 1 units  
  
Plane 11 ready to land.  
  
Plane 12 ready to land.  
plane 12 directed to another airport.  
  
Plane 13 ready to land.  
plane 13 directed to another airport.  
  
Plane 14 ready to land.  
plane 14 directed to another airport.  
7:Plane 6 landed in queue 2 units  
  
Plane 15 ready to land.  
8:Plane 7 landed in queue 2 units  
  
Plane 16 ready to take off.  
9:Plane 8 landed in queue 3 units  
10:Plane 9 landed in queue 4 units  
  
Plane 17 ready to land.  
  
Plane 18 ready to land.  
11:Plane 11 landed in queue 4 units  
  
Plane 19 ready to land.  
12:Plane 15 landed in queue 4 units  
13:Plane 17 landed in queue 2 units  
  
Plane 20 ready to land.  
  
Plane 21 ready to land.  
14:Plane 18 landed in queue 3 units  
  
Plane 22 ready to land.  
  
Plane 23 ready to land.  
15:Plane 19 landed in queue 3 units  
  
Plane 24 ready to land.  
16:Plane 20 landed in queue 2 units  
17:Plane 21 landed in queue 3 units
```

**Terminal Output (Bottom Screenshot):**

```
Plane 17 ready to land.  
  
Plane 18 ready to land.  
11:Plane 11 landed in queue 4 units  
  
Plane 19 ready to land.  
12:Plane 15 landed in queue 4 units  
13:Plane 17 landed in queue 2 units  
  
Plane 20 ready to land.  
  
Plane 21 ready to land.  
14:Plane 18 landed in queue 3 units  
  
Plane 22 ready to land.  
  
Plane 23 ready to land.  
15:Plane 19 landed in queue 3 units  
  
Plane 24 ready to land.  
16:Plane 20 landed in queue 2 units  
17:Plane 21 landed in queue 3 units  
  
Plane 25 ready to land.  
  
Plane 26 ready to take off.  
18:Plane 22 landed in queue 3 units  
  
Plane 27 ready to land.  
  
Plane 28 ready to land.  
19:Plane 23 landed in queue 4 units  
  
Plane 29 ready to land.  
20:Plane 24 landed in queue 4 units  
Simulation has concluded after 20 units.  
Total number of planes processed: 29  
Number of planes landed: 17  
Number of planes taken off: 3  
Number of planes refused use: 4  
Number left ready to land: 4  
Number left ready to take off: 4  
Percentage of time runway idle: 0.000000  
Average wait time to land: 2.647059  
Average wait time to take off: 2.000000  
PS C:\Users\Admin\Desktop\p1>
```

when expected number of arrivals or expected number of departures per unit time is -ve:

```
1
Program that simulates an airport with only one runway.
One plane can land or depart in each unit of time.
Up to 5 planes can be waiting to land or take off at any time.
How many units of time will the simulation run? 15

Expected number of arrivals per unit time? -0.5
Expected number of departures per unit time? -0.3
These numbers must be nonnegative.
Expected number of arrivals per unit time? 0.5
Expected number of departures per unit time? 0.4
1: Runway is idle.
2: Runway is idle.
3: Runway is idle.

Plane 1 ready to land.
4:Plane 1 landed in queue 0 units

Plane 2 ready to take off.
Queue is empty.
5:Plane 0 took off in queue 5 units

Plane 3 ready to land.
6:Plane 3 landed in queue 0 units
Queue is empty.
7:Plane 0 took off in queue 7 units

Plane 4 ready to land.
8:Plane 4 landed in queue 0 units
Queue is empty.
9:Plane 0 took off in queue 9 units

Queue is empty.
10:Plane 0 took off in queue 10 units

Plane 5 ready to take off.
Queue is empty.
11:Plane 0 took off in queue 11 units

Queue is empty.
7:Plane 0 took off in queue 7 units

Plane 4 ready to land.
8:Plane 4 landed in queue 0 units
Queue is empty.
9:Plane 0 took off in queue 9 units

Queue is empty.
10:Plane 0 took off in queue 10 units

Plane 5 ready to take off.
Queue is empty.
11:Plane 0 took off in queue 11 units

Plane 6 ready to take off.
Plane 7 ready to take off.
Queue is empty.
12:Plane 0 took off in queue 12 units

Plane 8 ready to land.
Plane 9 ready to land.
13:Plane 8 landed in queue 0 units

Plane 10 ready to take off.
14:Plane 9 landed in queue 1 units

Plane 11 ready to land.
15:Plane 11 landed in queue 0 units
Simulation has concluded after 15 units.
Total number of planes processed: 11
Number of planes landed: 6
Number of planes taken off: 6
Number of planes refused use: 0
Number left ready to land: 0
Number left ready to take off: 5
Percentage of time runway idle: 20.000000
Average wait time to land: 0.166667
Average wait time to take off: 9.000000
PS C:\Users\Admin\Desktop\p1>
```