SBCC26: Mystery App Instructions

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The committee will provide minimal help to the teams. However, teams will be provided with public resources and documentation. When viewing the NC files, teams will be expected to figure out how to view them. There are multiple ways to do so. The use of AI is **allowed**. GPU acceleration is **allowed**. Please ask questions if anything is unclear.

It does not hurt to ask questions!!!!!!!

NOTE: If you are having **storage issues**, record the values we require **before** deleting the experiment's folder.

How to build: https://docs.icon-model.org/buildrun/buildrun_running.html
Github/GitLab: https://gitlab.dkrz.de/icon/icon-model

Grading Breakdown

Percentage	Task
10%	Creating functional runs: Get a valid result from running `exp.aes_bubble` in `icon-model/run`
10%	Part 1.1: Free Response: Please write a step-by-step guide on how you ran the program (Be detailed!). Why did you do it this way instead of using other ways of parallelizing? What did work? What didn't work? If you used AI, which one(s) did you use, and what did it tell you to do? Be sure to include how you built it. Did you do it the normal way, or was there a different approach you took? Make sure to include any errors and what you did to try to fix said errors.
20%	Part 1.2: Running through the experiments: We will be grading based on the accuracy of our previously run experiments. We do **not** expect you to run through all of the programs. This portion of the grade will be normalized on the team that gets the most correct experiments. The answers will account for some rounding. **Rounding will be taken into account after teams submit their submissions.**
50%	Part 2.1: Reverse-Engineering: You will be given a set of parameters and a correct executable, given a 2-hour **simulation** time period. (see task 1, for example, and notice that end-date minus start-date = 2 hours) The team to get

	the most/closest will be awarded full marks. It will cascade based on performance
10%	Part 2.2: Record what values you used and what the outputs were in a docx or txt file (Be detailed!). If you asked an AI model, was it helpful? What did it say? Why do you think it guided you in the direction it did?

Submission and Grading Details:
Please submit a CSV copy of The Mystery App Grade Google Sheet. You may use whatever kind of CSV editor you choose.
Please submit a photo of `exp.aes_bubble` running correctly, **as well as the time** it took you to run it. **minus 3% if time is not included**
This should include the output files as well as a picture of how long it took
Please submit a **docx** or a **txt** file of your free response answers.

Files
You can find the files for each part and task here: click me!

Part 1
We want you to inspect the **3d** model file of the **earliest** date, **if** you have multiple *.nc files.
Fill out tasks 1, 2, and 3 with the following details

A. The **time** it took you to run each experiment file
B. The Air Density (rho)
C. The Air Pressure (pfull)
D. The Temperature (ta)
[redacted]
F. The Specific Humidity (hus)
G. The Meridional Speed (va)
H. The Virtual Potential Temperature (theta_v)

We are looking for the last value for the variable list

Task 1 will be awarded 1 point per correct detail (not including time) for a total of 7 points per experiment.
Task 2 will be awarded 2 points per correct detail (not including time) for a total of 14 points per experiment.
Task 3 will be awarded 3 points per correct detail (not including time) for a total of 21 points per experiment.

Part 2
Fill out what you believe the initial conditions are
Here are the following we are looking for
Name | [interval including said numbers] | (config name within file)

A. Temperature [290, 310] (aes_bubble_config%t0)
B. Sunlight Strength [560, 650] (sol_const)
C. Rayleigh Co-Efficient [0.02, 0.06] (rayleigh_coeff)
D. DivDamp Factor [0.0015, 0.0025] (divdamp_fac)
E. Lcoriolis (TRUE or FALSE) (lcoriolis)

You will be given both the `num_lev` and the Start/End date
Here is where you can find the tasks: click here!

You will be graded based on how close you are to the initial conditions. Rounding will take place after.

Part 2's tasks

Task 1:
Start Date; End Date = 2005-05-07T05:00:00Z; 2005-05-07T07:00:00Z
num_lev: 94
Rho: 1.1576246249176096
Pfull: 101202.18436346734
Ta: 301.7076738002899
Cpgtz: 303205.5245525854
Hus: 0.015430066393196823
Va: 1.300693053733584
Theta-V: 303.5071282398868

Task 2:
Start Date; End Date = 2005-11-19T06:40:00Z ; 2005-11-19T08:40:00Z
num_lev: 73
Rho: 1.1789601542037893
Pfull: 101162.15284259438
Ta: 296.90991888061046
Cpgtz: 298385.50963452406
Hus: 0.01121018714648765
Va: -0.0416445973515089
Theta-V: 297.9482913037287

Task 3:
Start Date; End Date = 2005-08-28T10:00:00Z ; 2005-08-28T12:00:00Z
num_lev: 118
Rho: 1.1557534548664075
Pfull: 101180.11060309729
Ta: 301.7956856216089
Cpgtz: 303293.9448521294
Hus: 0.018339642585562806
Va: -0.6791723600239153
Theta-V: 304.09070291084157

Task 4:
Start Date; End Date = 2004-11-24T02:00:00Z ; 2004-11-24T04:00:00Z
num_lev: 61
Rho: 1.1961939041030942
Pfull: 101189.02532322046
Ta: 293.05379917718057

Cpgtz: 294511.49897467846
Hus: 0.009272221678941931
Va: -0.012747191269597412
Theta-V: 293.71207202025874

Task 5:
Start Date; End Date = 2026-04-07T09:00:00Z ; 2026-04-07T11:00:00Z
num_lev: 86
Rho: 1.1656475937409327
Pfull: 101172.05723661325
Ta: 299.9604065065329
Cpgtz: 301450.1504437692
Hus: 0.013253374160897275
Va: -0.30131613191454537
Theta-V: 301.3722665584873

Task 6:
Start Date; End Date = Start Date; End Date = 2003-11-14T06:23:17Z ; 2003-11-14T08:23:17Z
num_lev: 78
Rho: 1.1760385983011226
Pfull: 101164.1552110568
Ta: 297.5827268630409
Cpgtz: 299061.43920570816
Hus: 0.011619515392731806
Va: -0.1596437652883167
Theta-V: 298.69473770599484

Task 7:
Start Date; End Date = 2012-04-09T13:45:02Z ; 2012-04-09T15:45:02Z
num_lev: 81
Rho: 1.1605059063753296
Pfull: 101233.20800127918
Ta: 300.8934244292281
Cpgtz: 302387.4974854368
Hus: 0.016371455784969256
Va: 0.46030650289381836
Theta-V: 302.8293146889281

Task 8:
Start Date; End Date = 2007-08-22T01:17:39Z ; 2007-08-22T03:17:39Z

num_lev: 78
Rho: 1.1936785377201111
Pfull: 101170.43627488604
Ta: 293.5863813652862
Cpgtz: 295046.55212242494
Hus: 0.009438211882088947
Va: 0.02210262032414627
Theta-V: 294.29126245452096

Task 9:
Start Date; End Date = 2018-02-03T19:58:44Z ; 2018-02-03T21:58:44Z
num_lev: 112
Rho: 1.152409073557717
Pfull: 101165.37565342658
Ta: 302.59173754418975
Cpgtz: 304093.69014413
Hus: 0.018637117943456273
Va: -0.5098330757373343
Theta-V: 304.9547200594341

Task 10:
Start Date; End Date = 2001-06-27T10:12:55Z ; 2001-06-27T12:12:55Z
num_lev: 105
Rho: 1.1659658971339053
Pfull: 101173.2221603551
Ta: 299.87628332075207
Cpgtz: 301365.63696361077
Hus: 0.01330400629111297
Va: -0.36952340127883954
Theta-V: 301.2949592051998

Updates:
Known issues: Missing `Torus_Triangles_20x4_5000m.nc`

Below is something that worked for me, it may or may not work for y'all

```
mkdir -p
~/icon-data/grids/public/mpim/Torus_Triangles_20x4_5000m
cd ~/icon-data/grids/public/mpim/Torus_Triangles_20x4_5000m
curl -L -o Torus_Triangles_20x4_5000m.nc \
"https://swift.dkrz.de/v1/dkrz_f765c92765f44c068725c0d08cc1e6c5/
easyGEMS/icon_bubble_torus.nc"
#make icon-data in home if you haven't...
export icon_data_rootFolder="$HOME/icon-data
#make sure the files exist
ls -lh ~/icon-data/grids/public/mpim/Torus_Triangles_20x4_5000m/
```

Part 0:
exp.aes_bubble photo should include the output files as well as a picture of how long it took

Part 1:
Detailed submission should include the last value of each variable list
The Air Density (rho)
The Air Pressure (pfull)
The Temperature (ta)
The Dry Static Energy (cptgz) ← was not included in the sheets so not counted
The Specific Humidity (hus)
The Meridional Speed (va)
The Virtual Potential Temperature (theta_v)

Part 2:

You will be given a set of parameters and a correct executable, given a 2-hour **simulation** time period. → see task 1, for example, and notice that end-date minus start-date = 2 hours.

Name | [interval including said numbers] | (config name within the file)
Temperature [290, 310] (aes_bubble_config%t0)
Sunlight Strength [560, 650] (sol_const)
Rayleigh Co-Efficient [0.02, 0.06] (rayleigh_coeff)
DivDamp Factor [0.0015, 0.0025] (divdamp_fac)
Lcoriolis (TRUE or FALSE) (lcoriolis)