

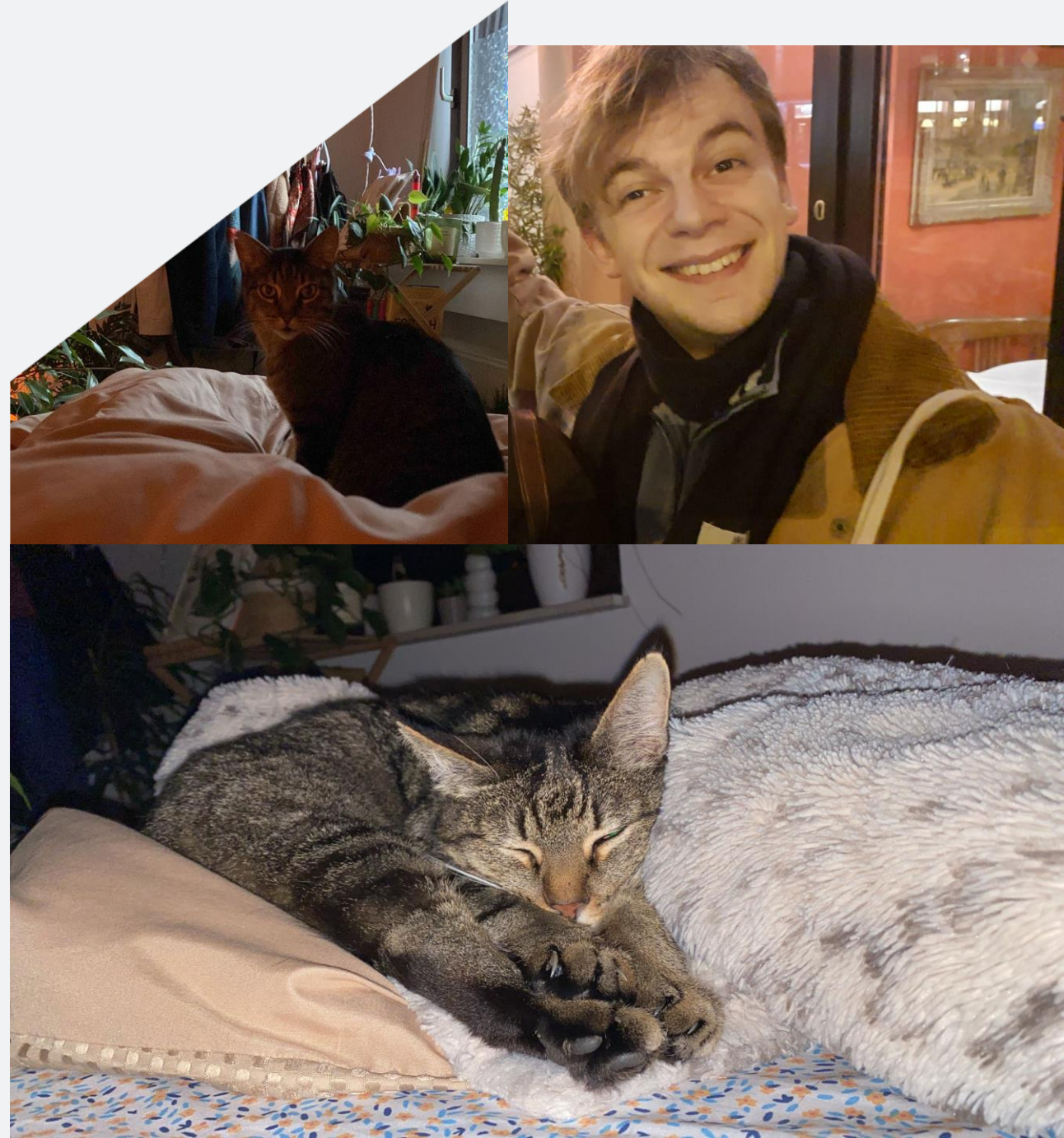
# Accounts of Accounting

*Or, how I learned to stop worrying and love the aquilon*

*A talk by Nicholas Whyatt, SCD*

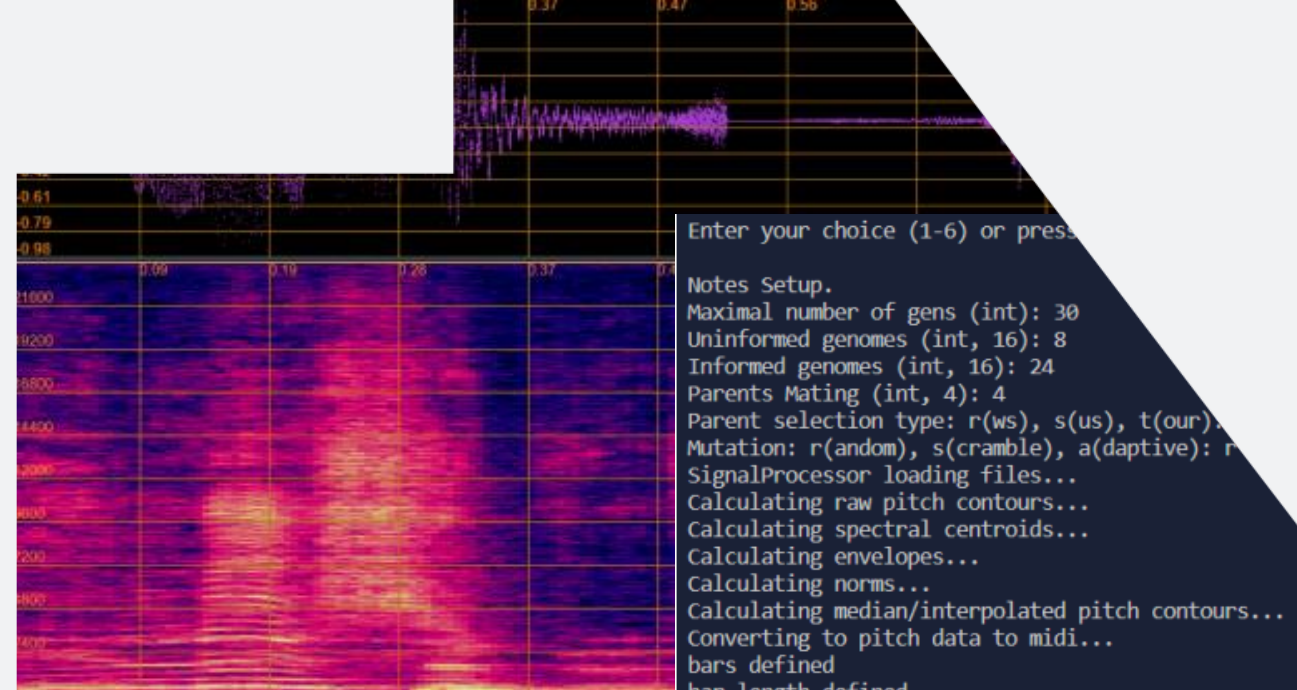
# Today's Speaker

- **Nicholas Whyatt**, Scientific Computing Graduate in Grid Tools
- Working under **Saiteja**, with **Adrian** as my primary technical contact
- BSc in Computer Science, thesis written about synthesisers (?)
- Background in speech processing and signal alignment
- Former (junior!) member of Machine Intelligence and Natural Interfaces/Speech and Hearing groups :)



# Brief Synth Nerdery

- “Data-Driven Composition and Sound Synthesis for Sonic Branding using Genetic Algorithms”
- Making music/instruments for advertising using search algorithms and virtual synthesisers
- Two separate genetic algorithms based on music theory and waveform analysis respectively
- Creates a virtual subtractive synthesiser from a text representation genome – fitness derived from resonances, partials, coherency and for the length and quality of sound
- Also, it used speech data????



```

Enter your choice (1-6) or press
Notes Setup.
Maximal number of gens (int): 30
Uninformed genomes (int, 16): 8
Informed genomes (int, 16): 24
Parents Mating (int, 4): 4
Parent selection type: r(ws), s(us), t(our)
Mutation: r(andom), s(cramble), a(daptive): r
SignalProcessor loading files...
Calculating raw pitch contours...
Calculating spectral centroids...
Calculating envelopes...
Calculating norms...
Calculating median/interpolated pitch contours...
Converting to pitch data to midi...
bars defined
bar length defined
Generate population called...
Generating 8 random genomes...
Generating 24 informed genomes...
Population generated.
    
```

Log/Exp Envelope	Envelope	Float range (0.70, 1.3)	Generate population called... Generating 8 random genomes... Generating 24 informed genomes... Population generated.
Order		Integer range (5, 50)	Order or other characteristic of tables.
Filter LFO Freq.		Weighted 0.0/1.0 Exclusive	Base frequency of LFO on filter cutoff, small float.
Vibrato LFO Freq.	LFO	Weighted 0.0/1.0 Exclusive	Base frequency of LFO on pitch vibrato, small float.
Vibrato Wave	LFO	Integer range(0, 8(+))	Waveform of vibrato LFO, and regulator – 8 or above turns it off. Modifying range modifies LFO chance.
Amplitude LFO Freq	Env.	Weighted 0.0/1.0 Exclusive	Base frequency of LFO on amp. env., small float
Amplitude LFO Wave	Env.	Integer range(0, 8(+))	Waveform of amp. env. LFO, and regulator – 8 or above turns it off. Modifying range modifies LFO chance.

# Being Held to Account

## My Tasks for the Rotation

- Build a GPU accounting dashboard for **IRIS**
- Build another one for the **InterTwin** project
- Maintain **APEL** (and **APEL-SSM**)
- Port APEL-SSM to Python 3 (entirely self-inflicted)

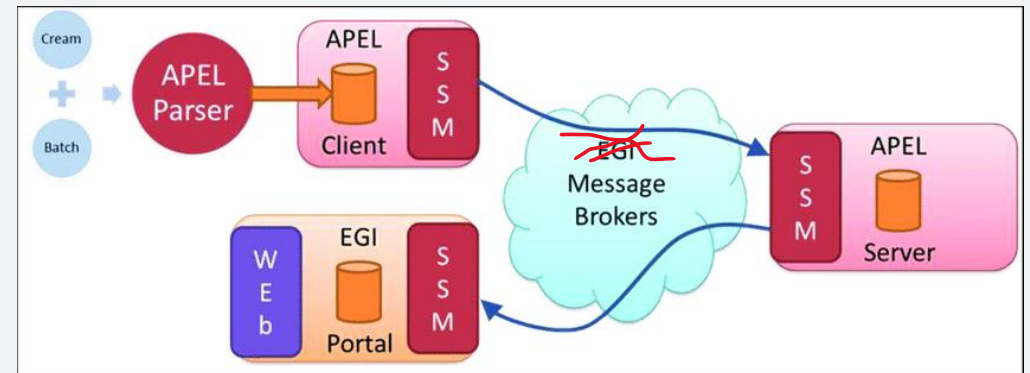
Plus, an **EEP project** (that I directed!)



# Vite, APEL-lez les comptables!

## APEL/-SSM Maintenance

- **APEL** is a very elegant accounting system with little sorcerous hijinks
- **SSM** (*Secure Stomp Messenger*) is an elegant messaging interface (that tries not to use Stomp, confusingly)
- **APEL** handles messages sent through **SSM** in varying formats, collating them into (usually monthly) **accounting records**
- We account not for costs, but for **resource utilisation**



# Vite, APEL-lez les compatables!

## Case Example: APEL-SSM 260, Timeout Work

- An early problem presented itself in adding timeouts to the underlying **AMS** library
- While the timeout was very easy to add, testing it was more difficult
- We set up receivers, made 100s of large messages, and beamed messages back and forth 'til **TCPKill** worked!

```
2023-09-15 14:25:50,589 - ssm.ssm2 - INFO - Found 95 messages.
2023-09-15 14:25:50,590 - ssm.ssm2 - INFO - Sending message: foo6
2023-09-15 14:26:49,363 - argo_ams_library.ams - WARNING - Retry #2 after 60 seconds, connection timeout set to 10 seconds - msg-devel.argo.grnet.gr: While trying the [topic_publish]: ConnectTimeout(MaxRetryError("HTTPSConnectionPool(host='msg-devel.argo.grnet.gr', port=443): Max retries exceeded with url: /v1/projects/accounting/topics/test:publish (Caused by ConnectTimeoutError(<urllib3.connection.HTTPSConnection object at 0x7fa7468755c0>, 'Connection to msg-devel.argo.grnet.gr timed out. (connect timeout=10)'))",),)
2023-09-15 14:27:00,618 - argo_ams_library.ams - WARNING - Retry #1 after 60 seconds, connection timeout set to 10 seconds - msg-devel.argo.grnet.gr: While trying the [topic_publish]: ConnectTimeout(MaxRetryError("HTTPSConnectionPool(host='msg-devel.argo.grnet.gr', port=443): Max retries exceeded with url: /v1/projects/accounting/topics/test:publish (Caused by ConnectTimeoutError(<urllib3.connection.HTTPSConnection object at 0x7f88bdd4e2e8>, 'Connection to msg-devel.argo.grnet.gr timed out. (connect timeout=10)'))",),)

```

**“I can port that.”**

***“It’ll be easy.”***

*A quote by Nicholas Whyatt, SCD*

# Vite, APEL-lez les compatables!

Issue	Title	Problem Description	Steps to Resolve
123	Build and test on CentOS 8		EL8, EL9
146	Bytes vs. text on python 3	Linked to issue 227, still for outgoing queue.	See 227
167	OpenSSL format change on x509	Linked to issue 167, use PyOpenSSL to handle a formatting change from version 1.0.2 to 1.1.1	Add PyOpenSSL as a dependency, take the string buffer and extract name from it, construct string from x509name object
91	Things to tidy up		Set 'check_crls' to TRUE ConfigParser: remove bad imports, format Remove __future__? Licenses: preserve year, use green apache 2.0 text
209	Planning for Python 3		
227	Check type issue (str/bytes) in outgoing queue	<code>_send_msg_ams</code> in <code>ssm2</code> : 'Unexpected exception in SSM: write() argument must be str, not bytes'	Convert to strings? Placement is weird. "Convert to strings after they are read allowed to send the messages"

*It really didn't look so bad!*





# FPM: F'really Painful Management

## An FPM script for RPM and DEBs

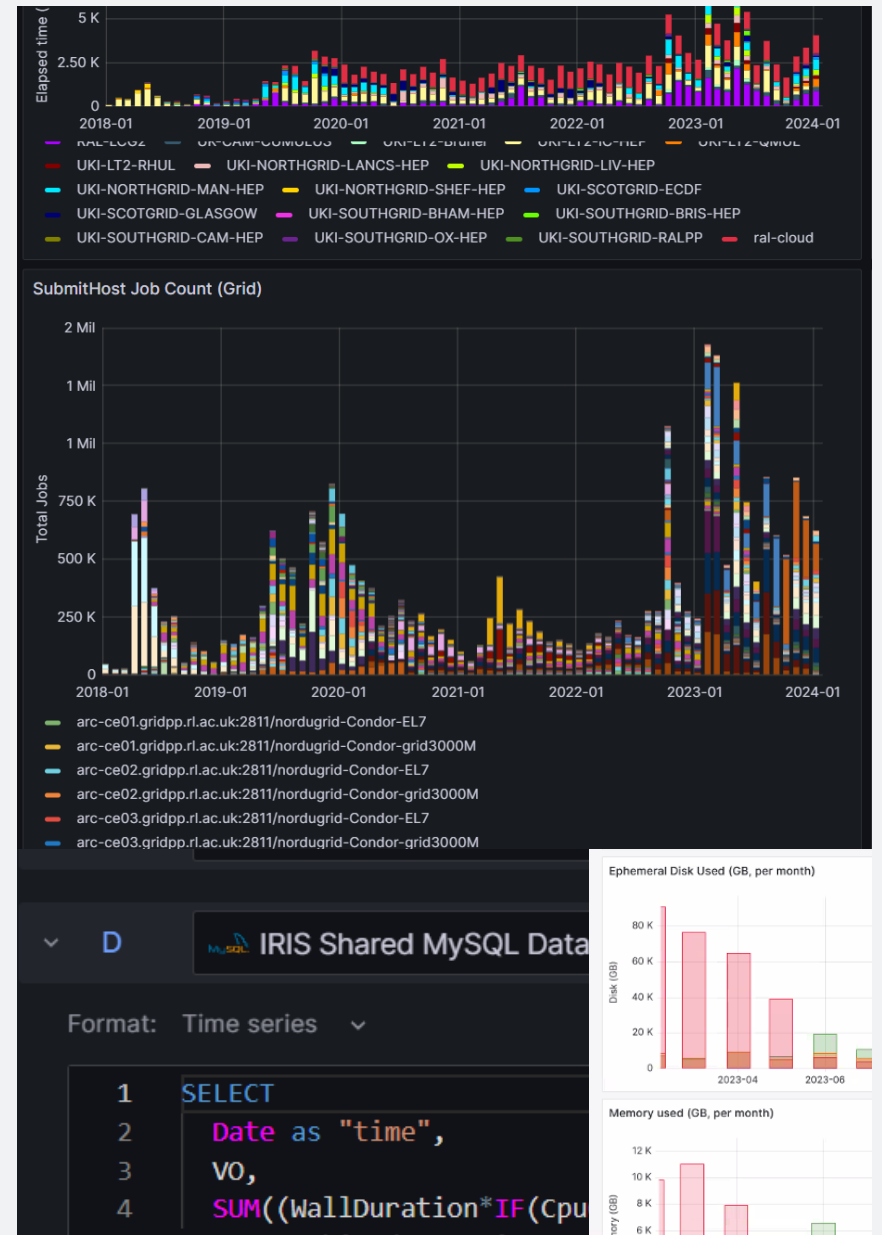
- **FPM** is a fast, powerful open-source package manager that has been successfully used for DEBs in SSM
- *“What if we had one script for EL and Debian? Convenient, right?”*
- Coinciding with supporting Python 2, with different system-specific install locations, this turned into a nested-if nightmare quickly
- Still running into issues today...
- Some things are better off separated for maintainability!

```
127
128     if [[ "$SPACK_TYPE" = "deb" ]]; then
129         FPM_PYTHON="--depends python3 \
130             --depends python-pip3 \
131             --depends 'python-stomp' \
132             --depends python-ldap \
133             --depends libssl-dev \
134             --depends libssl1.2-dev \
135             --depends openssl "
136
137         OS_EXTENSION="_all"
138
139     # Currently builds for e18
140     elif [[ "$SPACK_TYPE" = "rpm" ]]; then
141         FPM_PYTHON="--depends python3 \
142             --depends python3-stomppy \
143             --depends python3-pip \
144             --depends python3-ldap \
145             --depends openssl \
146             --depends openssl-devel "
147
148         OS_EXTENSION="e18"
149     fi
150
151 elif [[ $(PY_NUM:0:1) == "2" ]]; then
152     echo "Building $VERSION iteration $ITERATION for Python $PY_NUM as $SPACK_TYPE."
153
154     if [[ "$SPACK_TYPE" = "deb" ]]; then
155         FPM_PYTHON="--depends python2.7 \
156             --depends python-pip \
157             --depends 'python-stomp < 5.0.0' \
158             --depends python-ldap \
159             --depends libssl-dev \
160             --depends libssl1.2-dev \
161             --depends openssl "
162
163         OS_EXTENSION="_all"
164
165     # e17 and below, due to yum package versions
166     elif [[ "$SPACK_TYPE" = "rpm" ]]; then
167         FPM_PYTHON="--depends python2 \
168             --depends python2-pip \
169             --depends stomppy \
170             --depends python-ldap \
171             --depends openssl \
172             --depends openssl-devel "
173
174         OS_EXTENSION="e17"
175     fi
176 fi
177
178 # python-bin must always be specified in modern linux
179 PACKAGE_VERSION="--$SPACK_TYPE-changeLog $SOURCE_DIR/ssm-$VERSION-$ITERATION/CHANGELOG \
180 --$SPACK_TYPE-dist $OS_EXTENSION \
181 --python-bin /usr/bin/$PY_VERSION \
182 --python-install-lib $PYTHON_ROOT_DIR$LIB_EXTENSION \
```

# It's Accrual World

## GPU Accounting

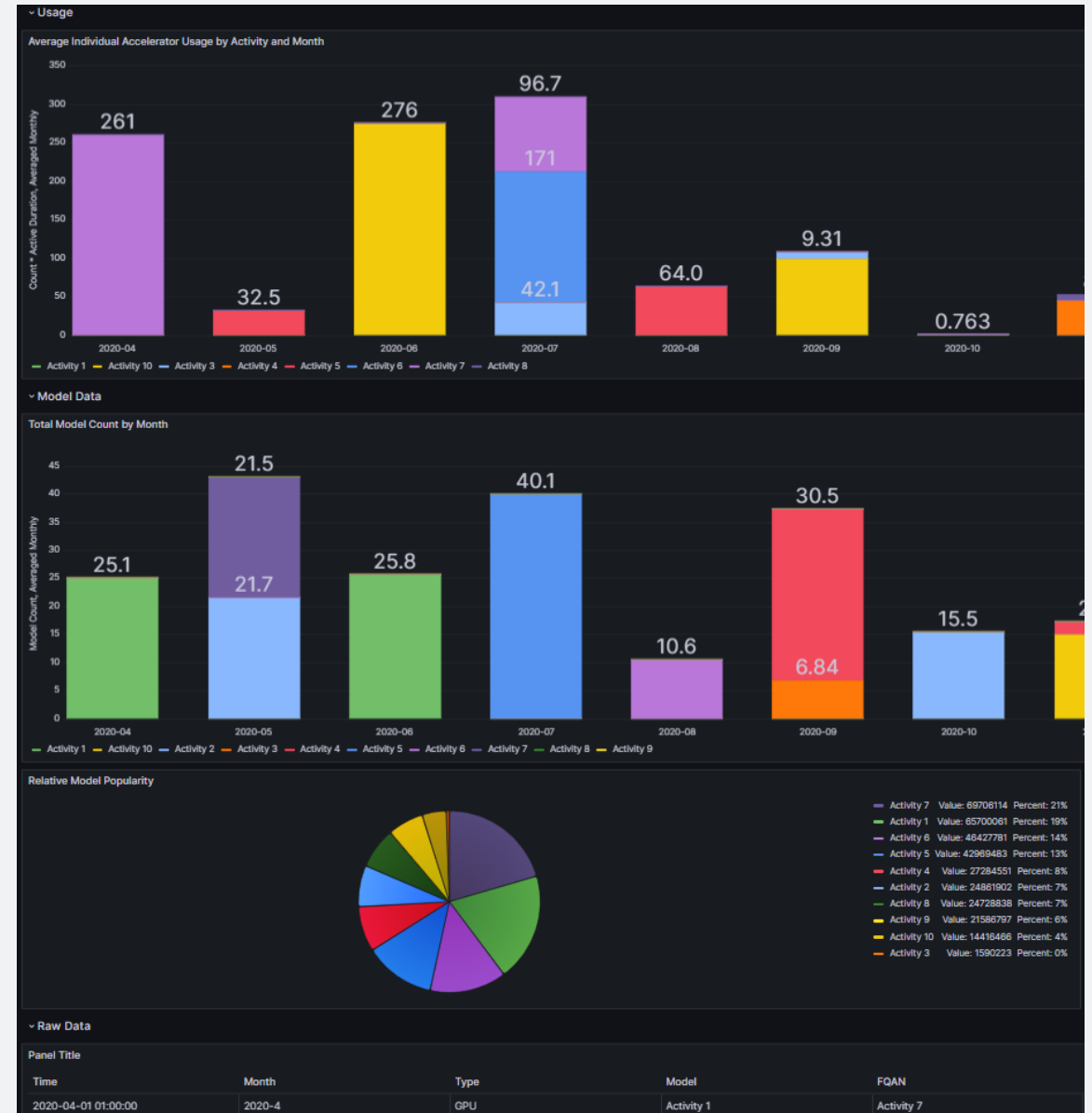
- How does one compare an A100 and a V100?
- **BENCHMARKING!** (Not there yet!)
- In lieu of an agreed benchmarking system, we have to compare individual models somehow
- And what if models are periodically outmoded?
- If we're just counting cards, is comparing a V100 to a 1080 fair?



# It's Accrual World

## Intermediary Solutions

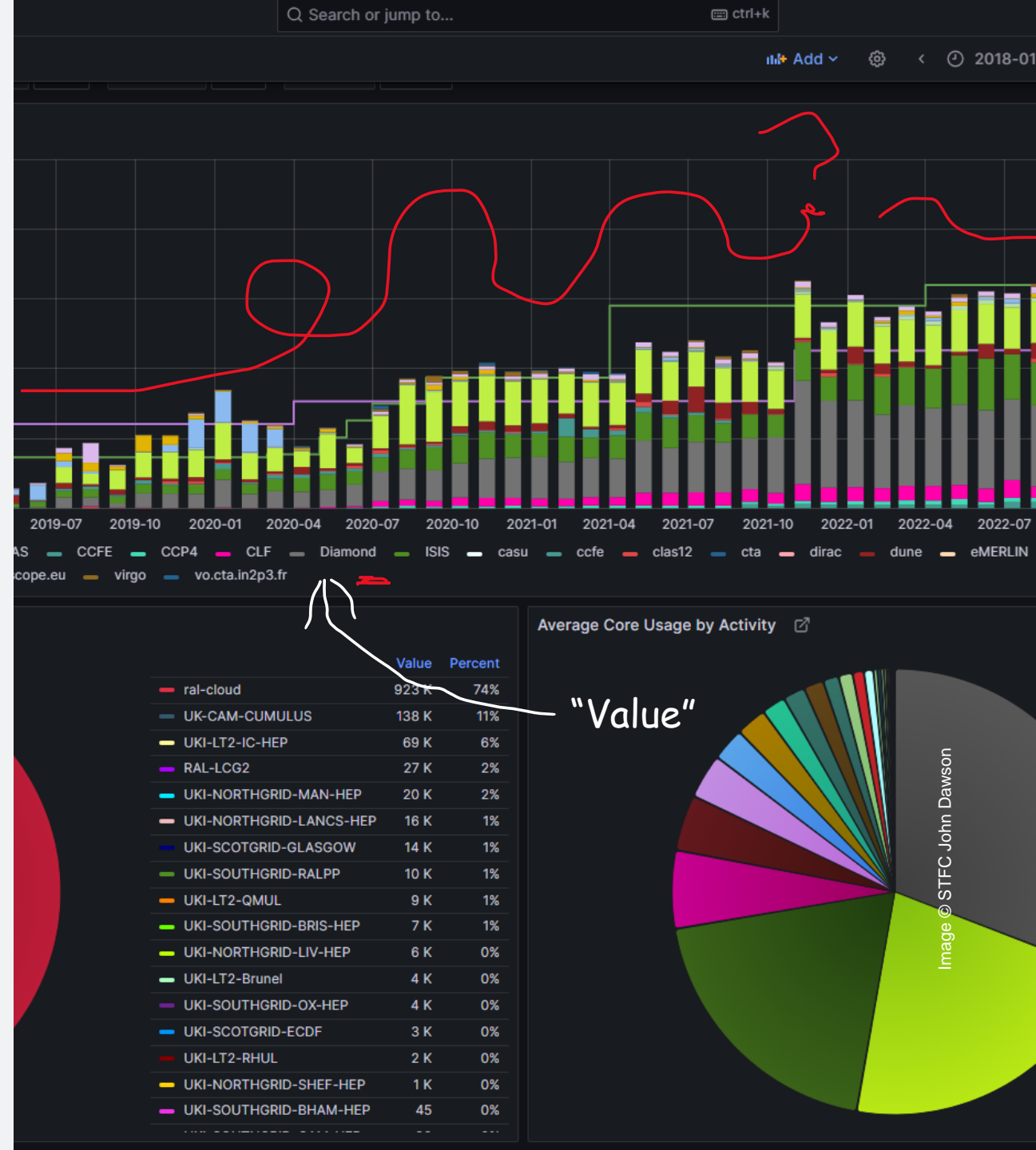
- Models can be categorised by time and primary usage through an additional table and variable additions
- The operation to map current model category is expensive: map to a periodic job to an intermediary table (thank you, Alex/Maksim!)
- Solution does not lose accounting data and can have indefinitely many categories added as needed



# Dashboards, #163

## Or, how I began considering cash rewards to stop dealing with Grafana

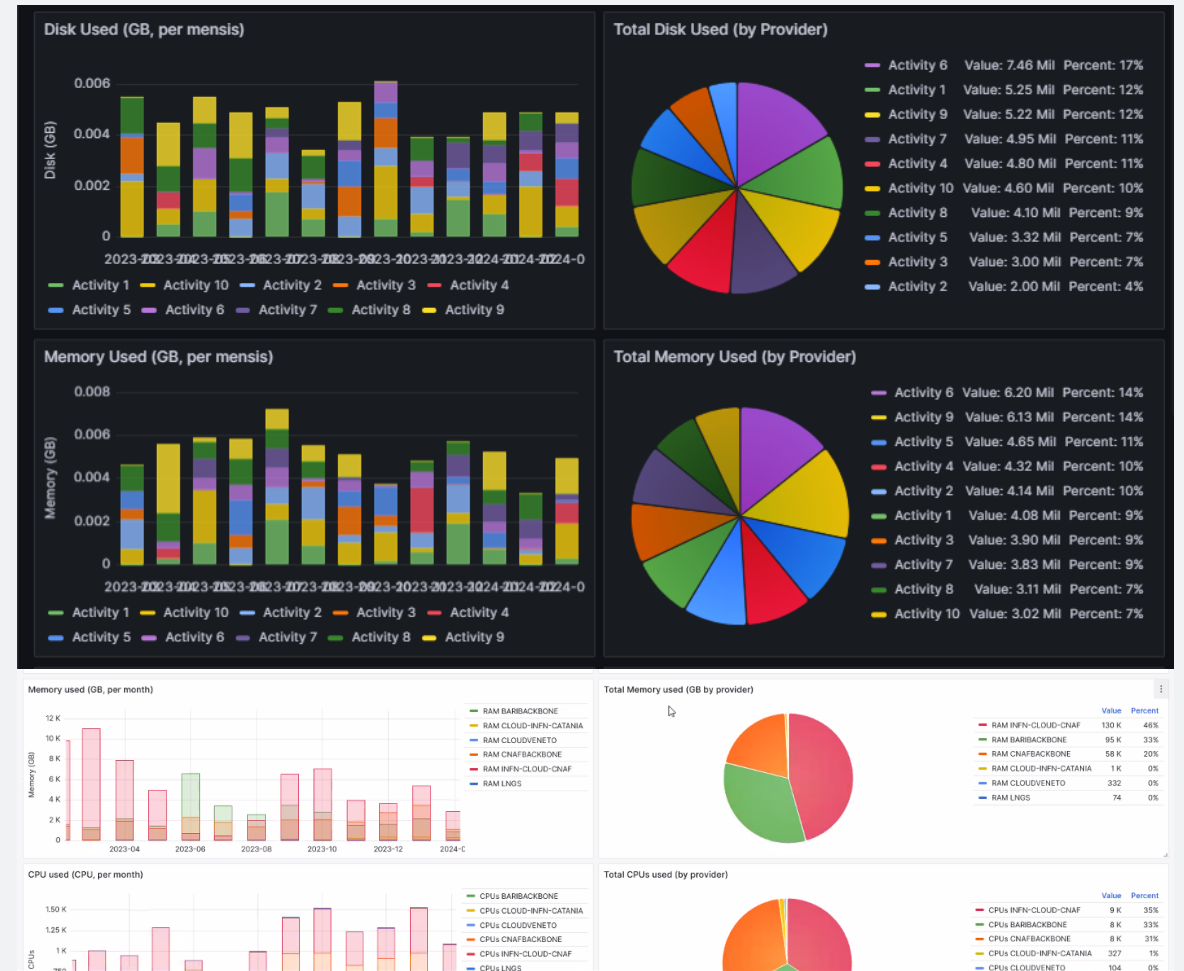
- A couple of errant VOs existed where they were all under the same user, but under different VOs
- Without losing historical data, can we alter these VOs to be presented under one VO in the graph?
- With an additional mapping table, and some funky query work, yes!
- ... only it's named "Value", no matter WHAT I DO
- If anyone figures it out, you know where to find me!



# An Auditional Dashboard

## InterTwinned Dashboard

- I also built a dashboard for the InterTwin project on the existing cloud schema
- (A comparatively simple issue, after trying to fix accelerators!)
- Stakeholder chosen design...
- ... in that I took screenshots of the design they wanted from their domestic system and did my best!

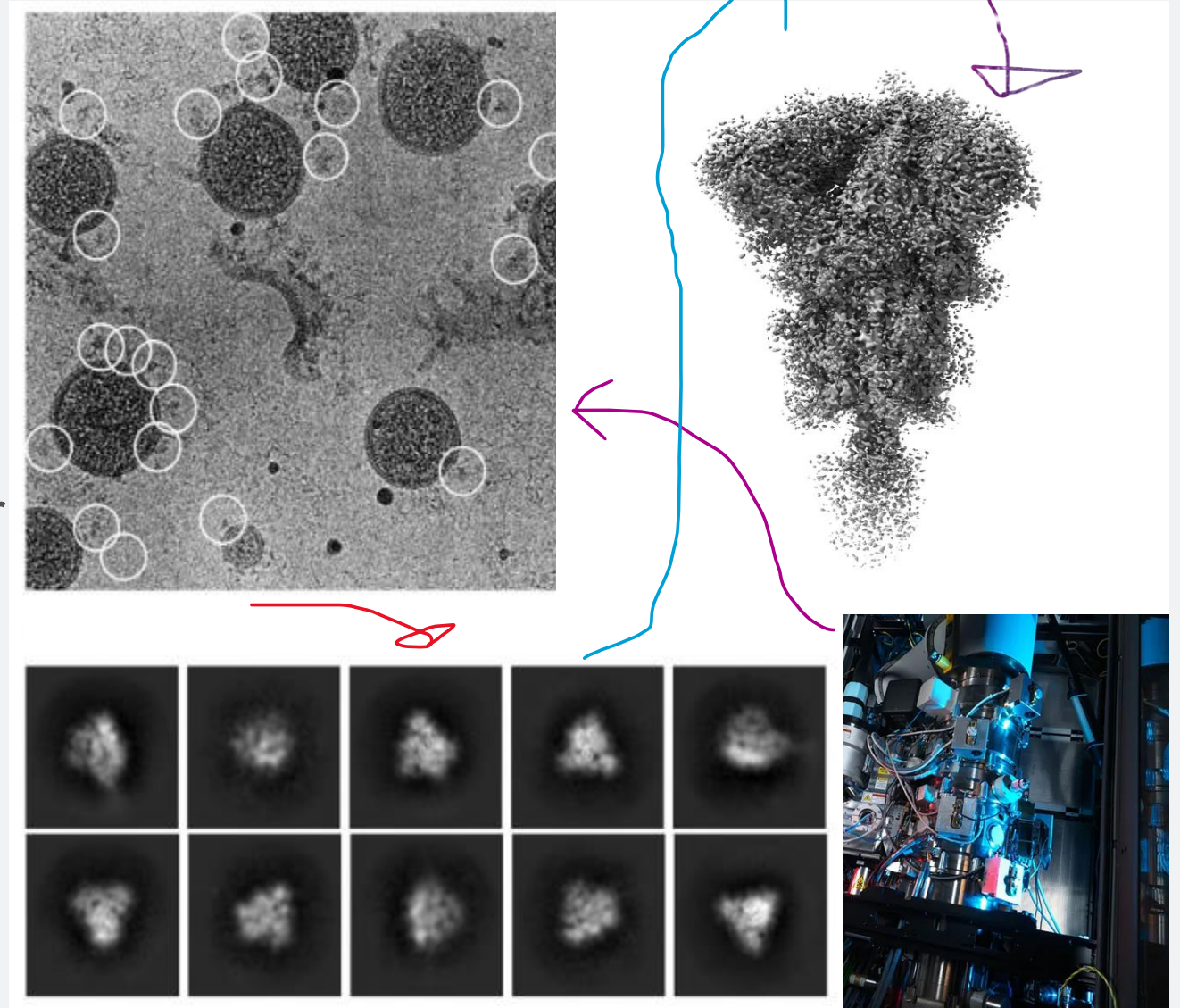


# Not Quite the Same Ledger-Demain

Math Wizardry???  
(Consult Tomography)

## Engineering Experience Project

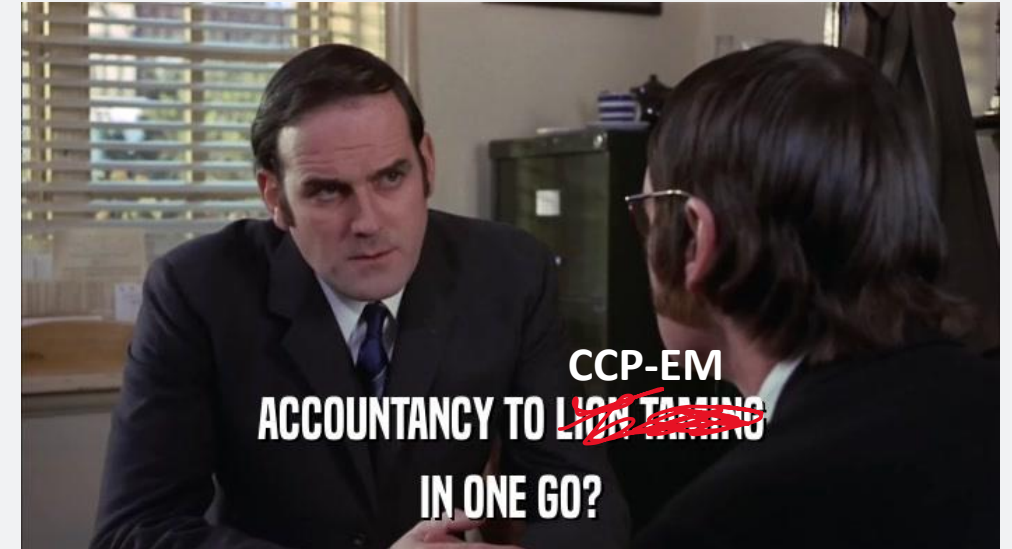
- Assisted very much by **Sony Malhotra**, my new LM!
- Teaching students to create a classifier of **2D class averages** for Cryo-EM to assist in single particle reconstruction
- It had dubious success
- But it's been fun!



# Second-Quarter Closing

## How did we do?

- Built a GPU accounting dashboard for **IRIS**
- Built another one for the **InterTwin** project
- Maintained APEL (and APEL-SSM) and fixed a few bugs
- Undoubtedly generated double that in the process
- Ported APEL-SSM to Python 3!
- Made a thorough stab at porting APEL-SSM to EL8/9 but we're figuring it out
- And miscellaneous events, hackathons etc :)
- Lots of public engagement (thanks, Greg!)
- And now, computational science!!!



# Thank you, Systems!

