1. RegTAP after VODataService 1.2

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VODataService 1.2 defines <coverage>.

To make it useful, it needs to be reflected in RegTAP.

Proposal: stc_temporal, stc_spectral, stc_spatial.

(cf. Fig. 1)

2. Simple Intervals

Time and spectrum would be in two tables (from TOPCAT on http://dc.g-vo.org/tap):

– i.e., 0 or more rows of MJD limits per resource.

(cf. Fig. 2)

– i.e., 0 or more rows of energy limits in J per resource.

(cf. Fig. 3)

3. A UDF to Match Intervals

I keep forgetting the right signs to check for the overlap of intervals (“Resources covering data from . . . to . . . ”).

Let’s have a UDF helping out there:

`ivo_interval_overlaps(l1 NUMERIC, h1 NUMERIC, l2 NUMERIC, h2 NUMERIC) -> INTEGER`

The function returns 1 if the interval [l1...h1] overlaps with the interval [l2...h2]. For the purposes of this function, the cases l1=h2 or l2=h1 is treated as overlap. The function returns 0 for non-overlapping intervals.

Alternative: We could define a proper INTERVAL type as envisioned by ADQL.

4. Joules are Painful

Having the spectral limits in energy is painful for everyone redward of X-ray, having them in Joules is painful for all.

Make writing queries against spectral nice using something like the prototype UDFs:

`gavo_specconv(expr NUMERIC, expr_unit TEXT dest_unit TEXT) -> NUMERIC`
`gavo_specconv(expr DOUBLE PRECISION, dest_unit TEXT) -> DOUBLE PRECISION`

For instance (“daerg” is of course not meant seriously):

```
SELECT gavo_specconv((spectral_start+spectral_end)/2, 'daerg') AS energy
FROM rr.stc_spectral
WHERE gavo_specconv(2000, 'Angstrom', 'J') BETWEEN spectral_start AND spectral_end
```

More on this: https://blog.g-vo.org/spectral-units-in-adql/

To make things feasible when people do not have a full implementation of VOUits, I suppose we should only require spectral units of m, nm, Angstrom, MHz, keV, and MeV – plus anything in the tables the service serves.

5. Mandatory UDFs?

We should probably require the interval comparison (which is simple) and the specconv (which is hard) UDFs for RegTAP-STC services.

We’re already requiring `ivo_string_agg`, `ivo_isasematch`, `ivo_hasword`, and `ivo_hashlist_has` in RegTAP – but specconv of course requires unit calculus to some extent...
6. Spatial Coverage

VODDataService 1.2 expresses coverage in MOCs. I think we have to require them in the table `rr_stc.spatial`:

(cf. Fig. 4)

That's a bit of an implementation hurdle. Should

`...WHERE 1=INTERSECTS(coverage, CIRCLE(30, 20, 1))`  
work? Or even:

`SELECT SUM(coverage) FROM stc.spatial
WHERE ivoid LIKE 'ivo://myauthority/%'`

pgsphere can do that – but perhaps restrict legal operations for ease of implementation?

7. Oh: Frames

VODDataService 1.2 defaults to ICRS MOCs, and MOC 1 restricts itself to ICRS.

Hence, `ref_system.name` currently is always NULL, and clients should always add a

`WHERE ref_system_name IS NULL`

Make this more explicit and have "no frame" map to 'ICRS' in RegTAP?

8. Closing Question

This has a few hard parts (specconv, in-DB MOC).

To lower the barrier for RegTAP implementors, the STC extension could be made optional.

On the other hand, we have 3 RegTAP operators, and it's not terribly likely we'll grow many more. And for clients, having guaranteed STC is a nice thing.

Opinions?  
Thanks!