Responsive Data Storage for Contur

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Current Contur

- Each point on a Contur heatmap summarises the results of a large number of individual comparisons between measured and predicted values.

- To gain insight into the physical meaning of the data requires drilling down to the underlying results, which is a slow process.

- Contur currently ignore some underlying results. Some information is also very fragmented. (e.g Exclusion for each point in grid mode / model info)

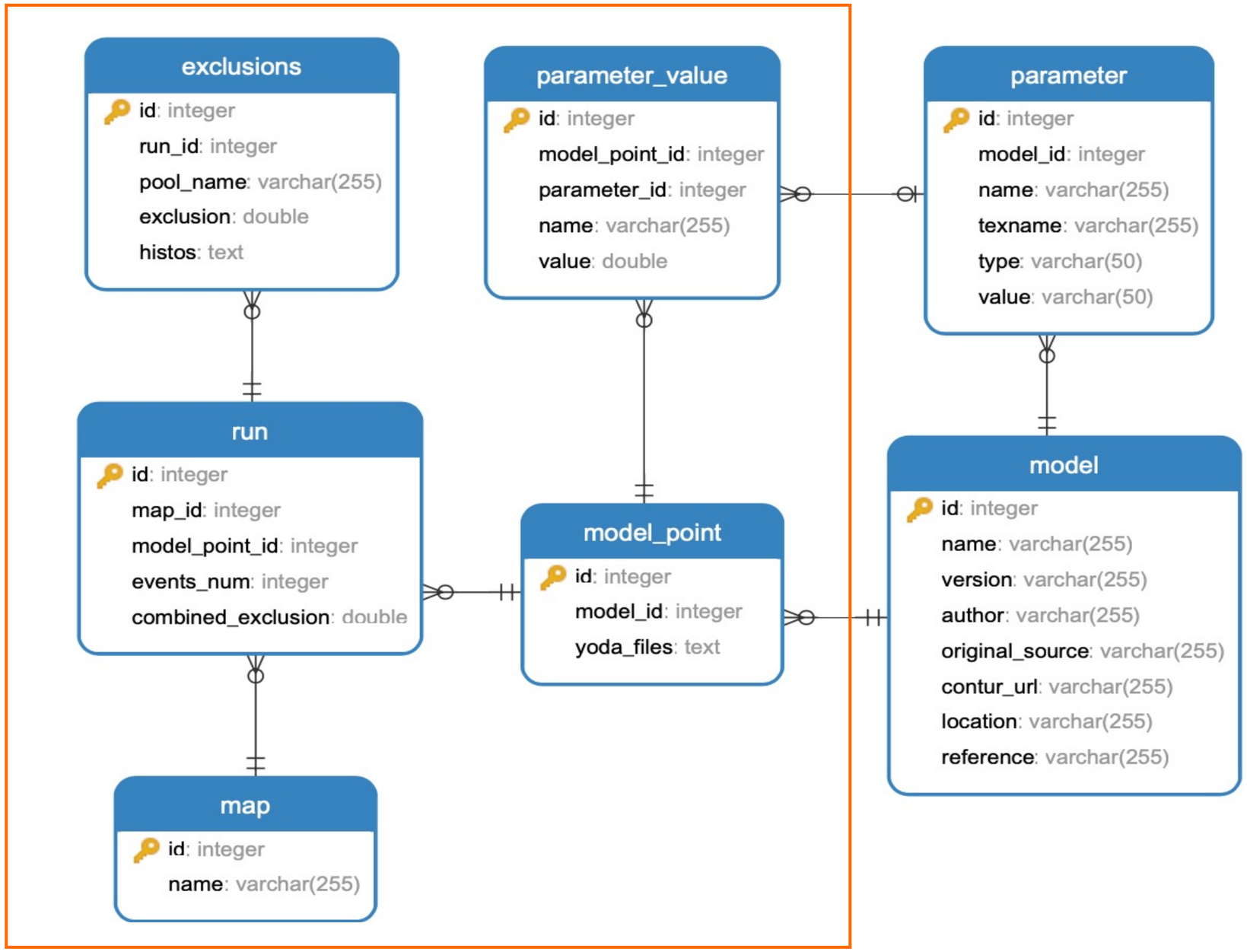
Motivation for Improvement

- Information availability: When running Contur the current system has no information about others runs that have occurred, and does not necessarily have visibility of all of the data required for more advanced analysis of the results. (e.g cannot link between the heatmap and the histograms)

- Collaboration: Contur is run locally by different users, with minimal automatic data transferred between them, it’ s not optimized for group collaboration on the analysis of BSM models. (consider central storage)

Responsive Storage Design

Generated during a Contur grid run



Generate Model and Parameter Data

1. Define a way to get the model source info to the DB

```
# Source.txt
name=test_model
version=1.0
url=https://gitlab.com/hepcedar/contur/-/tree/master/data/Models
contur_url=https://gitlab.com/hepcedar/contur/-/tree/master/data/Models/DM
author=Yujia Liu
reference=https://gitlab.com/hepcedar/contur/-/tree/master/data/Models
```

Or get the model information from “model name.log”

2. Get the parameters for a model from “parameters.py”

Parameter & Model Table

id	model_id	name	texname	type	value
1	1	ZERO	0	real	0.0
2	1	l2	\\lambda _2	real	0.5
3	1	l3	\\lambda _3	real	1
4	1	lR7	\\text{lR7}	real	0.1
5	1	aEWM1	\\text{aEWM1}	real	127.9
6	1	Gf	\\text{Gf}	real	0.000011663900000000002
7	1	aS	\\text{aS}	real	0.118
8	1	vmb	\\text{vmb}	real	4.7

Parameter

Model

	name	version	contur_url	location	reference	author	origina
1	G-W	0	https://gitlab.com/hepcedar/contur/-/tree/master/data/Models	/2HDM/Gildener-Weinberg/G-W	(NULL)	(NULL)	(NULL
2	2HDM_K1_UFO_final	0	https://gitlab.com/hepcedar/contur/-/tree/master/data/Models	/2HDM/KL-LH2017/2HDM_K1_UFO_final	(NULL)	(NULL)	(NULL
3	ALP	2.3.29	https://gitlab.com/hepcedar/contur/-/tree/master/data/Models	/ALP/ALP	(NULL)	(NULL)	(NULL
4	B-L-3	0	https://gitlab.com/hepcedar/contur/-/tree/master/data/Models	/B-L/B-L-3	(NULL)	(NULL)	(NULL
5	Standard_Model_cosmo_UFO	0	https://gitlab.com/hepcedar/contur/-/tree/master/data/Models	/DE/Standard_Model_cosmo_UFO	(NULL)	(NULL)	(NULL
6	DMSimp_t	0	https://gitlab.com/hepcedar/contur/-/tree/master/data/Models	/DM/DMSimp_t	(NULL)	(NULL)	(NULL
7	DM_vector_mediator_HF_UFO	2.3.24	https://gitlab.com/hepcedar/contur/-/tree/master/data/Models	/DM/DM_vector_mediator_HF_UFO	(NULL)	(NULL)	(NULL
8	DM_vector_mediator_UFO	2.4	https://gitlab.com/hepcedar/contur/-/tree/master/data/Models	/DM/DM_vector_mediator_UFO	(NULL)	(NULL)	(NULL
9	DMsimp_s_spin1	2.3.26	https://gitlab.com/hepcedar/contur/-/tree/master/data/Models	/DM/DMsimp_s_spin1	(NULL)	(NULL)	(NULL
10	DMspin2	2.4.43	https://gitlab.com/hepcedar/contur/-/tree/master/data/Models	/DM/DMspin2/DMspin2	(NULL)	(NULL)	(NULL

Other tables

- map :

corresponding to a map file, with unique name to distinguish each contur grid run

- model_point and parameter_value :

parameter point with parameter info, model info, yoda file info specified

- run : general result related to a parameter point

- exclusions :

detailed results which link histograms to each run

id	run_id	pool_name	exclusion	histos
1	1	ATLAS_13_EEJET	0	/ATLAS_2017_I1514251/d01-x01-y01
2	1	ATLAS_13_MMJET	0	/ATLAS_2017_I1514251/d02-x01-y01
3	1	ATLAS_13_METJET	0.0118174559824469	/ATLAS_2017_I1609448/d01-x01-y01
4	1	ATLAS_13_LMETJET	0	/ATLAS_2017_I1614149/d15-x01-y01
5	1	ATLAS_13_4L	0	/ATLAS_2017_I1625109/d02-x01-y01
6	1	ATLAS_13_GAMMA	0	/ATLAS_2017_I1645627/d01-x01-y01
7	1	ATLAS_13_JETS	0	/ATLAS_2018_I1634970/d01-x01-y01
8	1	ATLAS_13_TTHAD	0	/ATLAS_2018_I1646686/d01-x01-y01
9	1	ATLAS_13_L1L2MET_GAMMA	0	/ATLAS_2018_I1707015/d06-x01-y01
10	1	ATLAS_13_LMET_GAMMA	0	/ATLAS_2018_I1707015/d03-x01-y01

Modification for contur-gridtool

contur-gridtool --initDB

- populate the DB from a contur grid using contur-gridtools

contur-gridtool -f --findParam

- If the db is empty, search by scanning the “myscanxx” directory
- Else find parameter point from the db

```
(python38) [arielliu@pc191 run-area-simple-grid]$ contur-gridtool -f mXm=10 -f mY1=25 myscan00/
Writing log to contur_gridtool.log
INFO - Looking for the closest match to these parameter values: {'mXm': 10.0, 'mY1': 25.0}
INFO - These files have been identified as the nearest match: ['/unix/cedar/arielliu/contur/run-area-
simple-grid/myscan00/13TeV/0003/runpoint_0003.yoda.gz', '/unix/cedar/arielliu/contur/run-area-simple-
grid/myscan00/7TeV/0003/runpoint_0003.yoda.gz', '/unix/cedar/arielliu/contur/run-area-simple-grid/mys
can00/8TeV/0003/runpoint_0003.yoda.gz']
```

Modification for contur-gridtool

contur-gridtool --detail

- output detailed information for certain parameter point

parameter point / matched yoda files / combined exclusions / related histograms

```
(python38) [arielliu@pc191 run-area-simple-grid]$ contur-gridtool -f mXm=10 -f mY1=25 --detail myscan
00/
Writing log to contur_gridtool.log
INFO - Looking for the closest match to these parameter values: {'mXm': 10.0, 'mY1': 25.0}
INFO - ********************************
INFO - Parameters for this run is:
INFO - gYXm: 1.0
INFO - gYq: 0.25
INFO - mXm: 10.0
INFO - mY1: 25.0
INFO - Files identified as the nearest match: ['/unix/cedar/arielliu/contur/run-area-simple-grid/mysc
an00/13TeV/0003/runpoint_0003.yoda.gz', '/unix/cedar/arielliu/contur/run-area-simple-grid/myscan00/7T
eV/0003/runpoint_0003.yoda.gz', '/unix/cedar/arielliu/contur/run-area-simple-grid/myscan00/8TeV/0003/
runpoint_0003.yoda.gz']
INFO - Combined exclusion and number of events: 0.7364980360210491, 1000
INFO - Histograms contributed to the combined exclusion (exclusion>0.5):
INFO - pool:ATLAS_13_JETS, exclusion:0.583127382515656, histograms:/ATLAS_2018_I1634970/d03-x01-y01
INFO - pool:ATLAS_8_JETS, exclusion:0.5891366278647556, histograms:/ATLAS_2017_I1604271/d02-x01-y01
INFO - pool:CMS_8_JETS, exclusion:0.587587337766942, histograms:/CMS_2016_I1487277/d02-x01-y01
```

Modification for contur-gridtool

contur-gridtool --plot

- make histograms for specified parameters (slower)

```
(python38) [arielliu@pc191 run-area-simple-grid]$ contur-gridtool -f mXm=10 -f mY1=25 --plot myscan00
/
Writing log to contur_gridtool.log
INFO - Looking for the closest match to these parameter values: {'mXm': 10.0, 'mY1': 25.0}
INFO - These files have been identified as the nearest match: ['/unix/cedar/arielliu/contur/run-area-
simple-grid/myscan00/13TeV/0003/runpoint_0003.yoda.gz', '/unix/cedar/arielliu/contur/run-area-simple-
grid/myscan00/7TeV/0003/runpoint_0003.yoda.gz', '/unix/cedar/arielliu/contur/run-area-simple-grid/mys
can00/8TeV/0003/runpoint_0003.yoda.gz']
INFO - ************************************************
INFO - Starting making histogram for matched yoda files
gzip: /unix/cedar/arielliu/contur/run-area-simple-grid/myscan00/13TeV/0003/runpoint_0003.yoda.gz: No
such file or directory
Writing log to contur.log
INFO - Running Contur version2.1.x
INFO - See https://hepcedar.gitlab.io/contur-webpage/
INFO - Running Contur version2.1.x
INFO - See https://hepcedar.gitlab.io/contur-webpage/
INFO - Run Information
```

Thanks for Watching!