DUNE Resource Needs for 2022

Configuration: Parameters_2022-01-16-2026.json
Date: 2022-01-23 21:56TZ

This is the 2022 version of DUNE space needs projections [DUNE Docdb-23419 and Github].

The DUNE computing year is assumed to follow the UK fiscal year which starts on April 1, 2022.

- CPU contributions will be compared to pledges at the end of the fiscal year, i.e. Aoril 1, 2023
- Disk contributions will be compared to pledges 1/2 way through the year, October 1, 2022
- Contributions are divided into FNAL, CERN and collaboration and differ for different types of data.

Fiscal year starts: April 1
Tape is accounted for at: end of fiscal year
Disk is accounted for on: October 1
CPU is accounted for at: end of fiscal year
Reco passes per Year: 1
Sim passes per Year: 1
Analysis relative to Sim+Reco: 1

For data type Raw
Raw Tape lifetime 100.0 in years
Raw Tape Copies 2.0
Raw FNAL Tape fraction for PD 0.50
Raw FNAL Tape fraction for DUNE 0.50
Raw CERN Tape fraction for PD 0.50
Raw CERN Tape fraction for DUNE 0.00
Raw Collaboration Tape fraction for PD 0.00
Raw Collaboration Tape fraction for DUNE 0.50
Raw Disk lifetime 1.0 in years
Raw Disk Copies 1.0
Raw FNAL Disk fraction for PD 0.50
Raw FNAL Disk fraction for DUNE 1.00
Raw CERN Disk fraction for PD 0.50
Raw CERNDisk fraction for DUNE 0.00
Raw Collaboration Disk fraction for PD 0.00
Raw Collaboration Disk fraction for DUNE 0.00

For data type Test
Test Tape lifetime 0.5 in years
Test Tape Copies 1.0
Test FNAL Tape fraction for PD 0.50
Test FNAL Tape fraction for DUNE 0.50
Test CERN Tape fraction for PD 0.50
Test CERN Tape fraction for DUNE 0.00
Test Collaboration Tape fraction for PD 0.00
Test Collaboration Tape fraction for DUNE 0.50
Test Disk lifetime 0.5 in years
Test Disk Copies 0.5
Test FNAL Disk fraction for PD 0.50
Test FNAL Disk fraction for DUNE 0.50
Test CERN Disk fraction for PD 0.50
Test CERNDisk fraction for DUNE 0.00
Test Collaboration Disk fraction for PD 0.00
Test Collaboration Disk fraction for DUNE 0.50

For data type Reco
Reco Tape lifetime 15.0 in years
Reco Tape Copies 1.0
Reco FNAL Tape fraction for PD 0.75
Reco FNAL Tape fraction for DUNE 0.50
Reco CERN Tape fraction for PD 0.00
Reco CERN Tape fraction for DUNE 0.00
Reco Collaboration Tape fraction for PD 0.25
Reco Collaboration Tape fraction for DUNE 0.50
Reco Disk lifetime 2.0 in years
Reco Disk Copies 2.0
Reco FNAL Disk fraction for PD 0.25
Reco FNAL Disk fraction for DUNE 0.25
Reco CERN Disk fraction for PD 0.00
Reco CERNDisk fraction for DUNE 0.00
Reco Collaboration Disk fraction for PD 0.75
Reco Collaboration Disk fraction for DUNE 0.75

For data type Sim
Sim Tape lifetime 15.0 in years
Sim Tape Copies 1.0
Sim FNAL Tape fraction for PD 0.75
Sim FNAL Tape fraction for DUNE 0.50
Sim CERN Tape fraction for PD 0.00
Sim CERN Tape fraction for DUNE 0.00
Sim Collaboration Tape fraction for PD 0.25
Sim Collaboration Tape fraction for DUNE 0.50
Sim Disk lifetime 2.0 in years
Sim Disk Copies 2.0
Sim FNAL Disk fraction for PD 0.25
Sim FNAL Disk fraction for DUNE 0.25
Sim CERN Disk fraction for PD 0.00
Sim CERNDisk fraction for DUNE 0.00
Sim Collaboration Disk fraction for PD 0.75
Sim Collaboration Disk fraction for DUNE 0.75

Years	CPU (Mhrs)	Wall kSPEC06	Wall F/Collab kSPEC06	cores	Tape Total(PB)	Tape F/C/Collab	Disk Total(PB)	Disk F/C/Collab
2021	40	73	18/ 54	6594	21.1	14.1/ 3.6/ 3.5	20.4	5.3/ 0.4/ 14.7
2022	48	86	21/ 64	7779	33.4	21.8/ 6.5/ 5.1	27.3	7.6/ 1.6/ 18.1
2023	63	113	28/ 85	10286	49.4	31.7/ 10.7/ 7.0	33.0	9.4/ 2.4/ 21.2
2024	70	126	32/ 95	11455	62.2	40.2/ 12.9/ 9.1	35.2	9.5/ 1.4/ 24.3
2025	60	108	27/ 81	9824	69.8	45.9/ 12.9/ 11.0	32.2	8.1/ 0.2/ 23.9
2026	45	80	20/ 60	7257	76.6	51.0/ 13.0/ 12.7	28.7	7.3/ 0.2/ 21.2

Table 1: Assume present core is 11 SPEC06. CPU number is real CPU. Cores and SPEC06 are Walltime with CPU/Walltime = 0.70. F means FNAL, C means CERN. Assume CERN storage is only for ProtoDUNE. CPU should be divided 25% FNAL, 75% Collab

model disk	2021	Sim:13.8	Raw: 3.3	Reco: 3.5	Test: 0.0	Total:20.6
model tape	2021	Sim:10.0	Raw: 6.6	Test: 0.8	Reco: 4.3	Total:21.8
actual cpu	2021	Total:28.8	Analysis:10.3	MARS:12.0	Production: 6.5	
actual cores	2021	Total:4703.2	Analysis:1678.1	MARS:1963.5	Production:1061.6	
actual disk	2021	FNAL: 4.6	CERN: 1.0	UK: 2.2	CZ: 0.3	Total: 8.1
actual tape	2021	FNAL:19.8	CERN: 5.0	Total:24.8		

Table 2: Values for the points shown in the figures. Model disk and tape are the amounts we would project based on actual data cataloged if we had the number of copies expected in the model. This serves as a crosscheck on the inputs to the model but does not change its assumptions. The actual numbers are derived from wall time measured for 2021, the disk reported by rucio + FNAL disk cache and the total tape used at FNAL at CERN. Disk usage is lower as not all data have been copied. CPU usage is lower due to the delay in ProtoDUNE II running.

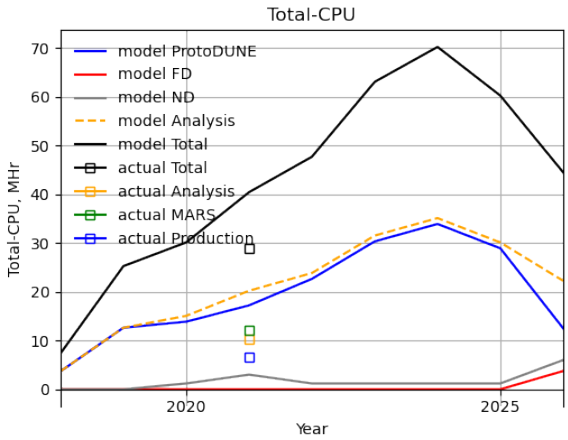

Figure 1: CPU time in Wall Hours/year. Squares are measured values for 2021.

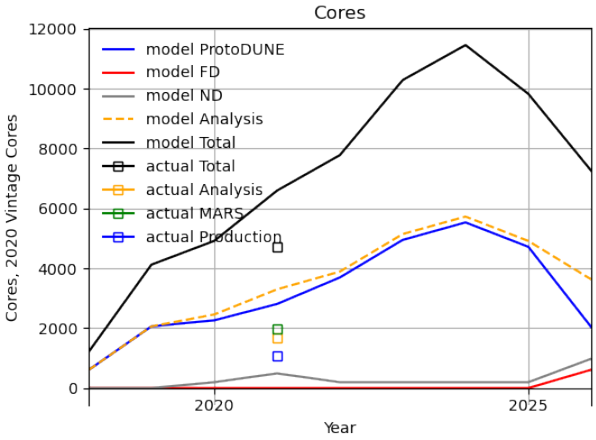

Figure 2: Cores needed, including efficiency loss. Squares are measured values for 2021.

Change log:
2022-01-22 add actual 's
2022-01-14 updates for VD channels and new drift times.
2021-07-25 see effects of PD 2 delay
2021-04-27 change HSPEC06 to 11 from 15 per CMS numbers from Kirby
2021-04-21 clarify CERN vs Collab for first 10 years
2021-03-26 clearer plots, go to v3 of the code to preserve the RRB code in v2
2021-03-24 try with CERN/FNAL combined for raw and test.
2021-03-22 add Collab vs FNAL shares, restore sim disk lifetime to 2.

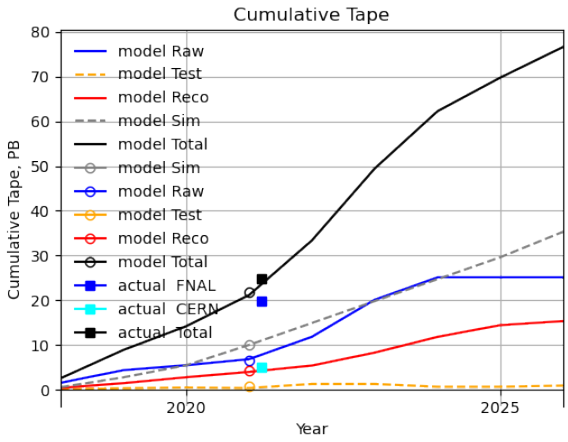

Figure 3: Projected tape needs, PB, all types are cumulative over tape lifetime. Open circles are model calculation based on actual data volumes in 2021. Closed squares are actual numbers by site. Offsets of square points are for clarity.

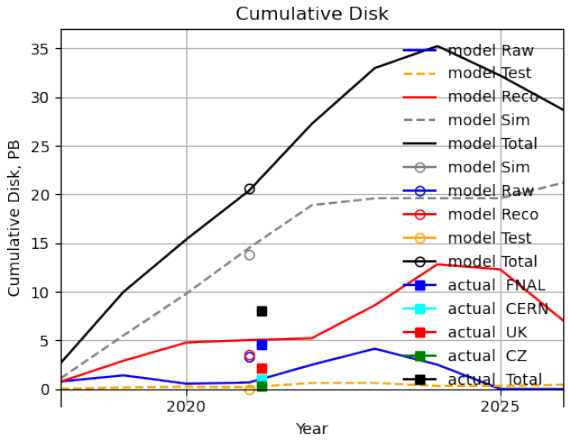

Figure 4: Disk needs, PB. Raw, Reco and Sim are cumulative over disk lifetime. Test has sub-year lifetime. Open circles are model calculation based on actual disk volumes in 2021. Closed squares are actual numbers from rucio as of 1/22/2022. Offsets of square points are for clarity.