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File Systems

Available file systems

On the DEEP-EST system, three different groups of file systems are available:

- the 2JSC GPFS file systems, provided via 2JUST and mounted on all JSC systems;
- the DEEP-EST (and SDV) parallel BeeGFS file systems, available on all the nodes of the DEEP-EST system;
- the file systems local to each node.

The users home folders are placed on the shared GPFS file systems. With the advent of the new user model at JSC (?JUMO), the shared file systems are structured as follows:

- \$HOME: each JSC user has a folder under /p/home/jusers/, in which different home folders are available, one per system he/she has access to.

 These home folders have a low space quota and are reserved for configuration files, ssh keys, etc.
- \$PROJECT: In JUMO, data and computational resources are assigned to projects: users can request access to a project and use the resources associated to it. As a consequence, each user can create folders within each of the projects he/she is part of (with either personal or permissions to share with other project members). For the DEEP project, the project folder is located under /p/project/cdeep/. Here is where the user should place data, and where the old files generated in the home folder before the JUMO transition can be found.

The DEEP-EST system doesn't mount the \$SCRATCH and \$ARCHIVE file systems from GPFS, as it is expected to provide similar functionalities with its own parallel file systems.

The following table summarizes the characteristics of the file systems available in the DEEP-EST and DEEP-ER (SDV) systems:

Mount Point	User can write/read to/from	Cluster	Тура	Global / Local	SW Version	Stripe Pattern Details	Maximum Measured Performance (see footnotes)	Description	Other	
/phome	johomaljuser	SESSEST.	GPFS exported via NFS	Global				Home directory; used only for configuration files.		
/plyroject	(p)projecticdes	SDV, BEEP-EST	GPFS exported via NFS	Global				Project directory; GPFS main storage file system; not suitable for performance relevant applications or benchmarking		
/work	/work/cdeep	DEEP-EST*	BeeGFS	Global	BeeGFS 7.1.2			Work file system	"Also available in the SDV but only through 1 Gig network connection	
/scratch	Ascratich	DEEP-EST	ats local partition	Local*				Scratch file system for temporary data. Will be cleaned up after job finishes!	*Recommends to use instead of /tmp for storing temporary files	d
/nvme/scratch	.hvme/scratch	DAM partition	local SSD (xh)	Local*				Scratch file system for temporary data. Will be cleaned up after job finishes!	"1.5 TB Intel Optane SSD Data Center (DC) P4800X (NVMe PCIe3 x4, 2.57, 3D XPoint()	
/evene/scratch	Shvme/scratch	DAM partition	local SSD (ext4)	Local*				Scratch file system for temporary data. Will be cleaned up after job finishes!	"1.5 TB Intel Optave SSD Data Center (DC) P4800X (N/Me PCIe3 x4, 2.57, 3D XPoint()	
/pmem/scratich	i (pmem/sorald	DAM partition (odd nodes)	DCPMM in appdirect mode	Local					dp-dam01, 2 TB in dp-dam(03, 05 Intal Optane DC Persistent Memory (DCPMM) 256GB DMMs based on Intal 7s 3D XPoint non-volatile mon-volatile sechnology	37.08.11.13.45
/adir-work	.hudv-work/cde	SDV (desperady nodes via EXTOLL, (SSUSSE mi-gau via, GBC only), DEDP-EST (1 GBC only)	BeeGFS	Giobal	BeeGF5 7.1.2	Type: RAID0, Chunksize: 512K, Number of storage tagets: desired: 4	1831.85 Millis write, 1306.62 Millis created 15302 opals create, 5111 opals serrows*	Work file system	"Test results and parameters used stored in AUDE: uservafeep 3 od ,	deng-er/abr-kenilmanka/systhetis/lor deng-er/abr-kenilmanka/systhetis/shtes
./tovtne	hvmeltrp	SOV	NVMe device	Local	BeeGFS 7.1.2	Block size:	1145 MBIs write, 3100 MBIs read 13048 03048 Craste, 62587 Opals namews*	1 NVMe device surface at each SDV compute node	result becchastis Test result and parameters used stored in JUBE: useovedeep 2 od youryloosi vesult becchastis "Test result "Test results"	Bang- ne ; alor- demokratika ke jeget berl ke i kes Bang- ne ; alor- demokratik ke jeget berl ke i rati ma Bang- ne ; alor- demokratik ke jeget berl ke i rati ma
/milbeand	inntbeend	SDV	BeeGFS On Demand running on the NVMe	Local	BeeGFS 7.1.2	Block size: 512K	1130 MBl/s write, 2447 MBl/s read 12511 opals create, 15414 opals services*	1 BeeCND Instance running on each NVMe device	"Test results and parameters used street in JUSE" uncovadeep 3 od /usr/local, uncovadeep 5 jube2 results heachmarks uncovadeep 3 od /usr/local, uservadeep 2 od /usr/local, uservadeep 5 jube2 results heachmarks	dang-ne / ndr-kencimanka / nyuthetis/ior dang-ne / ndr-kencimanka / nyuthetis/indt na

Stripe Pattern Details

It is possible to query this information from the deep login node, for instance:

```
manzano@deep $ fhgfs-ctl --getentryinfo /work/manzano
Path: /manzano
Mount: /work
EntryID: 1D-53BA4FF8-3BD3
Metadata node: deep-fs02 [ID: 15315]
Stripe pattern details:
+ Type: RAID0
+ Chunksize: 512K
+ Number of storage targets: desired: 4
manzano@deep $ beegfs-ctl --getentryinfo /sdv-work/manzano
Path: /manzano
Mount: /sdv-work
EntryID: 0-565C499C-1
Metadata node: deeper-fs01 [ID: 1]
Stripe pattern details:
+ Type: RAID0
+ Chunksize: 512K
+ Number of storage targets: desired: 4
```

Or like this:

```
manzano@deep $ stat -f /work/manzano
File: "/work/manzano"
         Namelen: 255
                              Type: fhgfs
Block size: 524288 Fundamental block size: 524288
Blocks: Total: 120178676 Free: 65045470 Available: 65045470
Inodes: Total: 0
                      Free: 0
manzano@deep $ stat -f /sdv-work/manzano
File: "/sdv-work/manzano"
  ID: 0 Namelen: 255
                             Type: fhgfs
Block size: 524288 Fundamental block size: 524288
Blocks: Total: 120154793 Free: 110378947 Available: 110378947
Inodes: Total: 0
                        Free: 0
```

See http://www.beegfs.com/wiki/Striping for more information.

Additional infos

Detailed information on the **BeeGFS Configuration** can be found ?here.

Detailed information on the BeeOND Configuration can be found ?here.

Detailed information on the ${\bf Storage\ Configuration\ }$ can be found $\underline{{\bf ?here}}.$

Detailed information on the Storage Performance can be found ?here.

Notes

- The /work file system which is available in the DEEP-EST prototype, is as well reachable from the nodes in the SDV (including KNLs and ml-gpu
 nodes) but through a slower connection of 1 Gig. The file system is therefore not suitable for benchmarking or I/O task intensive jobs from those
 nodes
- Performance tests (IOR and mdtest) reports are available in the BSCW under DEEP-ER → Work Packages (WPs) → WP4 → T4.5 Performance measurement and evaluation of I/O software → Jülich DEEP Cluster → Benchmarking reports:
 ?https://bscw.zam.kfa-juelich.de/bscw/bscw.cgi/1382059

• Test results and parameters used are stored in JUBE:

```
user@deep $ cd /usr/local/deep-er/sdv-benchmarks/synthetic/ior
user@deep $ jube2 result benchmarks

user@deep $ cd /usr/local/deep-er/sdv-benchmarks/synthetic/mdtest
user@deep $ jube2 result benchmarks
```