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## File Systems

### Available file systems

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

- the [JSC GPFS file systems](#), provided via [JJUST](#) 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 has a folder within each of the projects he/she is part of. For the DEEP project, such 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 `$$CRATCH` and `$ARCHIVE` file systems, 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	Type	Global / Local	SW Version	Stripe Pattern Details	Maximum Measured Performance (see footnotes)	Description	Other
/p/home	/p/home/jusers	SDV DEEP-EST	GPFS	Global				Home directory; used only for configuration files.	
/p/project	/p/project/cdeep	SDV DEEP-EST	GPFS	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
/sdv-work	/sdv-work/cdeep	SDV (deeper-sdv nodes via EXTOLL, m-gpu via GbE only), DEEP-EST (1 GbE only)	BeeGFS	Global	BeeGFS 7.1.2	Type: RAID0 Chunksize: 512K, Number of storage targets: desired: 4	1831.85 MiB/s write, 1308.62 MiB/s read 15202 ops/s create, 5111 ops/s remove	Work file system	*Test results and parameters used stored in JUBE:  user@deep \$ cd /usr/local/deep-er/sdv-benchmarks/synthetic/lor user@deep \$ jube2 result benchmarks  user@deep \$ cd /usr/local/deep-er/sdv-benchmarks/synthetic/rdtest user@deep \$ jube2 result benchmarks
/nvme	/nvme/tmp	SDV	NVMe device	Local	BeeGFS 7.1.2	Block size: 4K	1145 MiB/s write, 3108 MiB/s read 139148 ops/s create, 62567 ops/s remove	1 NVMe device available at each SDV compute node	*Test results and parameters used stored in JUBE:  user@deep \$ cd /usr/local/deep-er/sdv-benchmarks/synthetic/lor user@deep \$ jube2 result benchmarks  user@deep \$ cd /usr/local/deep-er/sdv-benchmarks/synthetic/rdtest user@deep \$ jube2 result benchmarks
/mnt/beond	/mnt/beond	SDV	BeeGFS On Demand running on the NVMe	Local	BeeGFS 7.1.2	Block size: 512K	1130 MiB/s write, 2447 MiB/s read 12511 ops/s create, 18424 ops/s remove	1 BeeOND instance running on each NVMe device	*Test results and parameters used stored in JUBE:  user@deep \$ cd /usr/local/deep-er/sdv-benchmarks/synthetic/lor user@deep \$ jube2 result benchmarks  user@deep \$ cd /usr/local/deep-er/sdv-benchmarks/synthetic/rdtest user@deep \$ jube2 result benchmarks

## 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"
ID: 0      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 **Storage Configuration** can be found [?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
```