

E4S: The Extreme-scale Scientific Software Stack Release 21.11



Release 21.11 notes

November 10, 2021

Extreme-scale Scientific Software Stack (E4S)



- E4S: HPC Software Ecosystem – a curated software portfolio
- A **Spack-based** distribution of software tested for interoperability and portability to multiple architectures
- Available from **source, containers, cloud, binary caches**
- Leverages and enhances SDK interoperability thrust
- Not a commercial product – an open resource for all
- Oct 2018: E4S 0.1 - 24 full, 24 partial release products
- Jan 2019: E4S 0.2 - 37 full, 10 partial release products
- Nov 2019: E4S 1.0 - 50 full, 5 partial release products
- Feb 2020: E4S 1.1 - 61 full release products
- Nov 2020: E4S 1.2 (aka, 20.10) - 67 full release products
- Feb 2021: E4S 21.02 - 67 full release, 4 partial release
- May 2021: E4S 21.05 - 76 full release products
- Aug 2021: E4S 21.08 - 88 full release products
- Nov 2021: E4S 21.11 - 91 full release products



<https://e4s.io>

Lead: Sameer Shende
(U Oregon)

Also include other products .e.g.,
AI: PyTorch, TensorFlow (CUDA, ROCm)
Co-Design: AMReX, Cabana, MFEM

E4S Download from <https://e4s.io>

HOME EVENTS ABOUT E4S PRODUCT DOCPORTAL E4S COMMUNITY POLICIES CONTACT US JOIN E4S FAQ [DOWNLOAD](#)

Extreme-scale Scientific Software Stack (E4S) version 21.11

Exascale Computing Project (ECP) Software Technologies (ST) software, Extreme-scale Scientific Software Stack (E4S) [v21.11](#), includes a subset of ECP ST software products, and demonstrates the target approach for future delivery of the full ECP ST software stack. Also available are a number of ECP ST software products that support a Spack package, but are not yet fully interoperable. As the primary purpose of the v21.11 is demonstrating the ST software stack release approach, not all ECP ST software products were targeted for this release. Software products were targeted primarily based on existing Spack package maturity, location within the scientific software stack, and ECP SDK developer experience with the software. Each release will include additional software products, with the ultimate goal of including all ECP ST software products.

[E4S v21.11 Notes.](#)

[E4S Manual Installation Instructions.](#)

[E4S Container Installation Instructions.](#)

Using E4S Containers

The current E4S container offerings include Docker images for Red Hat Enterprise Linux 7, Red Hat Enterprise Linux 8, Ubuntu 18.04 (Bionic), and Ubuntu 20.04 (Focal Fossa). Our images can run on X86_64, PPC64LE, and AARCH64 depending on the particular image. In addition to offering a full E4S image containing a comprehensive selection of E4S software released on a quarterly cycle, we also offer a set of minimal base images suitable for use in Continuous Integration (CI) pipelines where Spack is used to build packages.

Docker images are available on the [E4S Docker Hub](#).

Recipes which can be used to build some of our images from scratch are available on the [E4S GitHub repository](#).

Our recipes make use of Spack packages available as pre-built binaries in the [E4S Build Cache](#).

Download E4S 21.11 GPU Container Image: NVIDIA, AMD, Intel

Container Releases

- Docker Downloads
- Singularity x86_64 Download**
- Singularity ppc64le Download
- OVA Download

From source with Spack

Visit the Spack Project

Note on Container Images

```
# docker pull ecpe4s/e4s-gpu
```

E4S GPU Images

Multi-Arch Image (X86_64 and PPC64LE)

This is a full-featured multi-arch image.

It contains all relevant GPU stacks, the full set of E4S release packages installed w/ Spack, Python machine learning packages optimized for GPU, and TAU.

ecpe4s/e4s-gpu

e4s-gpu-x86_64.sif mirror 1 mirror 2

e4s-gpu-ppc64le.sif mirror 1 mirror 2

GPU Base Images

These images come with MPICH, CMake, and the relevant GPU SDK – either ROCM, NVIDIA CUDA Toolkit and NVHPC, or Intel OneAPI – available as LMOD modules

NVIDIA Multi-Arch (X86_64, PPC64LE, AARCH64)	ROCM X86_64	Intel OneAPI X86_64
ecpe4s/e4s-base-cuda	ecpe4s/e4s-base-rocm	ecpe4s/e4s-base-intel
e4s-x86_64-cuda.sif mirror 1 mirror 2	e4s-x86_64-rocm.sif mirror 1 mirror 2	e4s-x86_64-oneapi.sif mirror 1 mirror 2
e4s-aarch64-cuda.sif mirror 1 mirror 2		
e4s-ppc64le-cuda.sif mirror 1 mirror 2		

- Full featured Singularity image
- GPU base images for
 - x86_64 (Intel, AMD, NVIDIA)
 - ppc64le
 - aarch64
- Packages with support for all three GPU runtimes:
 - Kokkos
 - TAU

21.11 Release: 91 Official Products + dependencies (gcc, x86_64)

```
1: adios2 /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/adios2-2.7.1-4qzf7mzvvhgree7vhzia5homece6jzc2k
2: alquimia /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/alquimia-1.0.9-m25eouqzbzraqqesmpqeyyiwldeihq3r
3: aml /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/aml-0.1.0-52bcp4rwi6xzklr2qpl3a3huqle6sszh
4: amrex /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/amrex-21.11-7bb5j5a6ozsgddf2eyrffpy2brqknewq
5: arborx /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/arborx-1.1-qdabctwt5xpypik2kdfn53ueifpy3mw5i
6: argobots /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/argobots-1.1-6vbx4fbx3ert23po2fzeuddnya12wniy
7: ascent /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/ascent-0.7.1-aijl3oqrcrdoz2bgabeyvtg6uzc4seob
8: axom /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/axom-0.5.0-xaa26pwr3yr625ums6b4p6uxobmrgzkh
9: bolt /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/bolt-2.0-fh7dq6fzfzeie5fl3nzingindyvggges6v
10: butterflypack /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/butterflypack-2.0.0-otoimkvs5kwd7fool3uqf5574dysb7ud
11: cabana /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/cabana-0.4.0-hczsjbp2bke3b2ovuvyubr6f4kfwzdt
12: caliper /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/caliper-2.7.0-6wyi2jsiepczmlgxztjjiaopqr26iy
13: catalyst /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/catalyst-5.6.0-h77spazrgb6ydf765iyuglvqdivvook
14: chai /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/chai-2.4.0-cvcm7qh457whligo46z73avoi3wdsxy
15: charliecloud /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/charliecloud-0.25-dtxafv2422vaxp7ihqmc332ytm5v6mzt
16: conduit /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/conduit-0.7.2-kx4lp6skbe7sstmulhzzszusw37yfdq
17: darshan-runtime /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/darshan-runtime-3.3.1-6zcvdaohaeszbt2cuandygbfwn7dnn
18: datatransferkit /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/datatransferkit-3.1-rc3-53dtzpnkqhdejqjptw4j6wqijsjo26u
19: dyninst /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/dyninst-11.0.1-r63gihwhdsrehmchw45duykrueggorz3
20: faodel /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/faodel-1.2108.1-gocysw2xc4rjp3av2rfokhu4dvrn2ml
21: flecsi /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/flecsi-2.1.0-iuioizszdjxiuknomqpehlnte2asi54r
22: flit /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/flit-2.1.0-ywc5thidgsdtg6474uxgqkdnefyaf75l
23: flux-sched /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/flux-sched-0.19.0-cc5zm4atwcpkoybecpc4r3khhkdxh3mtj
24: fortrilinos /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/fortrilinos-2.0.0-ywy56z7jihaxy3vvc67i7vjbelczc
25: gasnet /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/gasnet-2021.9.0-37bcasne2t26z4f7rju7fy52eeqoo0lx
26: ginkgo /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/ginkgo-1.4.0-7b5gicftkdjm5vi5phvyrmw5ichochock
27: globalarrays /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/globalarrays-5.8-bv7uslrymise7kjadm72okt26yziyo47
28: gotcha /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/gotcha-1.0.3-u6tтыkuc7w75fpckuy4piy72uhdxvdx
29: hdf5 /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/hdf5-1.12.1-h2uwi5y62osghdrb6xsgdt3lmo6h2ylj
30: heffte /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/heffte-2.2.0-eri5pxovnynn557l2nurwddxmgpvrsth
31: hpctoolkit /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/hpctoolkit-2021.10.15-vbfmrd3qzvlgfzafyn2lolb3hkc1sq5v
32: hpx /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/hpx-1.7.1-tdou2dmt5p4nbcrtbuyhi35exzvr5ldi
33: hypre /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/hypre-2.23.0-h5cudf346j2hti7exgdrbxu4pwt46ii
34: kokkos /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/kokkos-3.4.01-klsmq76webvynj3helrcfexc3lcuucmb
35: kokkos-kernels /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/kokkos-kernels-3.4.01-sd4zmqbi4i67tc77lzapltak6tnchasn
36: legion /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/legion-21.03.0-aipgy23rif36pv4u4pivatzuqhvrvg4jf
37: libnrm /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/libnrm-0.1.0-mjn3bmqp5ub7ooz35qnooartbjnnoqx
38: libquo /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/libquo-1.3.1-pah7fsgud2hpwdkbnapp7jam337kxtul
39: loki /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/loki-0.1.7-2zpo6dh6bdrko47n4gziaacm6xteojflm
40: magma /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/magma-2.6.1-hzi3pvxdl7k6fgupj4laagccli3zwr5
41: mercury /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/mercury-2.0.1-jbzjyopvabgyzwy3ne75nlsv7wl4etwh
42: metall /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/metall-0.17-dd7fzx7g34o7ggiitwpgw6aqendc4ul
43: mfem /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/mfem-4.3.0-emaug2hqogpviv2ov5y4lw7rsybtziiw
44: mpich /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/mpich-3.4.2-bfamq5fmi7yh3fdkwv4vw6xn7rr5lc75
45: mpifileutils /spack/opt/spack/linux-ubuntu20.04-x86_64/gcc-9.3.0/mpifileutils-0.11-onrcotnug776fdz55av3xoyw7d5wmwst
```

GPU runtimes

- Intel (oneAPI)
 - 2021.4
- AMD (ROCm)
 - 4.3
- NVIDIA (CUDA)
 - 11.4
- NVHPC
 - 2021.9

21.11 Release: 91 Official Products + dependencies (contd.)

```
46: mpifileutils /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/mpifileutils-0.11-ajx7675xid7lvcfk4u4ifbunshdqzz7k
47: netlib-scalapack /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/netlib-scalapack-2.1.0-xn73q57pjteeundik4shoezrlo2g6mrq
48: ninja /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/ninja-1.10.2-txpvjbtkrj7ovnuLuobagoqgn5gabg3d
49: nrm /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/nrm-0.1.0-yyrb64omok3tyqh6gzolo3k3h54y5rj
50: omega-h /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/omega-h-9.34.1-gaulvejvniqawi6fbazyknuqfinffnjw
51: openpmd-api /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/openpmd-api-0.14.3-mnziagkceftx7wm3kwzc4pk7dmkrkg5q
52: openmpi /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/openmpi-4.1.1-uw4owrxv26x3ygr5q7udhme3freqwmzl
53: papi /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/papi-6.0.0.1-ehedapozusx3i7lfpichari5atqvmh74
54: papyrus /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/papyrus-1.0.1-dl6ak3mnzzltiwusuriolnfl5ksz2wxw
55: parallel-netcdf /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/parallel-netcdf-1.12.2-nxbqhe3qkzdxu6o4hsk2vqnpq3mswqjg
56: paraview /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/paraview-5.9.1-xixczmgqgnhdx2x5dyzgp532zua2jwow
57: parsec /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/parsec-3.0.2012-h2m2judrwzxigevr6q3j7wnrqct67sfh
58: pdt /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/pdt-3.25.1-dfzobkfuiqczpxae5hfnfezqm6gpqi3wk
59: petsc /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/petsc-3.16.1-vtjffjiaq2amthfdc5hbgphy5l7snp2i4
60: plasma /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/plasma-21.8.29-xdwxc3zrgusitrac72mqkurknhrsbzof
61: precice /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/precice-2.3.0-mxwok2fd6meuzcv6v5lmd5bv4zpugrk5
62: pumi /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/pumi-2.2.6-b7ydidbb45j03kkced2kjahpnqtg4qti
63: py-jupyterhub /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/py-jupyterhub-1.4.1-35l5htiyp6a64azpehogjt4vf2f2no67
64: py-libensemble /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/py-libensemble-0.8.0-f27asumkzcgzbzxhnrknsyoxy3sfpql
65: py-parisl /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/py-parisl-1.1.0-e3ge67qfhnhto57ubonckxoywezsqyga
66: py-radical-saga /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/py-radical-saga-1.8.0-lbuszbgvc3ibbqwhrldcurhpkloroco7f
67: py-radical-pilot /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/py-radical-pilot-1.8.0-wkjkzqke2v2dpdvapay7emxj2jtaif2f4
68: qthreads /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/qthreads-1.16-kcir2bkoatobn4e2qz7fmcrrfs7pgn4v
69: raja /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/raja-0.14.0-ns3dxwugr5fbufgvhyxqe3ydi6ip7mbr
70: rempi /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/rempi-1.1.0-ib2lnlqhr3zvmrnrnbgatgbcujfnw6vzv
71: scr /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/scr-3.0rc2-gb3auatilui4yrlo4cjpgvhabwve254id
72: slate /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/slate-2021.05.02-wb4vynciraa7dqksegnhvkv7kx64frhy
73: slepc /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/slepc-3.16.0-hgn6jvzk2oo5q5cdiybvuiurjmmvdf2k
74: strumpack /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/strumpack-6.1.0-i7t4sy35etpvmzajlyljvp4ncgf3g5
75: sundials /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/sundials-5.8.0-q4wq3fsvsa7ml3xjstb3nmsc4sb2pdb7
76: superlu-dist /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/superlu-dist-7.1.1-hft52tkp3cbvl7c6ushtpp566iad72qk
77: stc /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/stc-0.9.0-w2ubukpoj7ouvf5wrxmwxvxfm225nsx7
78: swig /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-11.1.0/swig-4.0.2-tlf7zpbptp7vx66s5dsy2ujx57lt6qne
79: sz /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/sz-2.1.12-n5wgbtryijanb6p6qh27p36daq4y2mce
80: tasmanian /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/tasmanian-7.7-i6urkzufeppqw6yygpz2upj2j2iwbphhi
81: tau /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/tau-2.31-cegfgg37nxemdsio6c2jxr3knu54njdr
82: trilinos /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/trilinos-13.2.0-7tgdn7m6rhcct4jxuwujinkhu6as54sw
83: turbine /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/turbine-1.3.0-ur5he6cmg73k6dolxsbaysvfaunceua
84: umap /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/umap-2.1.0-7sqkyikt6qkgfbgnxgwbjwy2ia47cc5d
85: umpire /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/umpire-6.0.0-qy2li7mkl4wgbhplga6gqudrw3pl64mw
86: unifyfs /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/unifyfs-0.9.1-xdusd5vqnurbrl3priwyjutxbq3cpki
87: upcxx /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/upcxx-2021.9.0-nb32n2wmpjqos77untzfkfte15426e4o
88: veloc /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/veloc-1.5-tl435lrbllqcwj46hq32aan6frqmoq5gi
89: vtk-m /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/vtk-m-1.6.0-yw4rayrgc3foebzaunuptat4urdu5js3
90: warpx /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/warpx-21.11-5vf3w65haj2jydmr34bcjhx54u4oce25
91: zfp /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/zfp-0.5.5-o2thmry2kturpuooiprs75wjmlieixk7b
```

E4S v2021-02 Release: GPU, ppc64le for Docker Containers

The screenshot shows the Docker Hub interface for the repository `ecpe4s/e4s-gpu`. The repository is owned by `ecpe4s` and was updated an hour ago. It is categorized as a 'Container' and has 21 pulls. The page includes a 'Manage Repository' button and a 'Tags' section. The 'Tags' section shows two tags: `latest` and `21.11`. The `latest` tag was pushed an hour ago by `esw123` and has two architectures: `linux/amd64` (52.33 GB) and `linux/ppc64le` (36.23 GB). The `21.11` tag is also listed. There is a 'docker pull ecpe4s/e4s-gpu:latest' command snippet and a 'docker pull ecpe4s/e4s-gpu:21.11' command snippet.

- 91 E4S Products
- Support for GPUs
 - ppc64le and x86_64

% docker pull ecpe4s/e4s-gpu

E4S 21.11 GPU Release: 91 E4S Products (ppc64le)

```
1: adios2 /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/adios2-2.7.1-idgyfzdotfy6gpxicr7ukcd2zqy7dtk
2: alquimia /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/alquimia-1.0.9-sba2gv6nbjr7x6cvscivj7udb6ql4s4k
3: aml /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/aml-0.1.0-dvzmjuczox3ubd7lnxdgoggoksk5v43k
4: amrex /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/amrex-21.11-bochehw3hziv3hvpjfgzk4qzukup434
5: arborx /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/arborx-1.1-2ocu7oexml06bbr6ki7nhcqzvhsvf7di
6: argobots /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/argobots-1.1-trhfaqcmt2ib5tsw4axzqls4tbbxt45
7: ascent /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/ascent-0.7.1-b4h5qerq2jeb2sfqmjtrbttzt5tjzpz7e
8: axom /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/axom-0.5.0-bmdk6urkjs6ustj7ubmmm4vg4uo2cwaj
9: bolt /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/bolt-2.0-lfkm2qifo3qdvddgdcqeq2b7rgv3yesq
10: butterflypack /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/butterflypack-2.0.0-qxe43g2fxpww5h4bzttdzjptlp27idy7
11: cabana /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/cabana-0.4.0-vgtzjwojg6hljiki5o4qwybvpty274
12: caliper /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/caliper-2.7.0-ssibgi4tqiioyedewfxj7jcxlju67gdw
13: chai /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/chai-2.4.0-c6aszygyyenxc6yedmgfwb7hujtmci
14: charliecloud /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/charliecloud-0.25-45c55u3sg54qt3u5zvpa3leyin57rn2f
15: conduit /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/conduit-0.7.2-gtel3lgymuoc2v4emndmhgbbi2bn3zfa
16: darshan-runtime /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/darshan-runtime-3.3.1-dtybw7bvkl4otzpdout456zjv3cya5
17: datatransferkit /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/datatransferkit-3.1-rc3-lexrtrlqllbpwygagneq6tinikqft5l5
18: dyninst /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/dyninst-11.0.1-6kmzpsa5uuruuefeo2463qvua4z3oej
19: exaworks /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/exaworks-0.1.0-ibfujbaymzdnvx4rxtx5hnfv6kygye
20: faodel /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/faodel-1.2108.1-ferf32uf3dninjzbrqr3fhic3pkfti5
21: flecsi /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/flecsi-1.4.2-j6eul76nv3jwum6g2ifh7x3lacdn2u3i
22: flit /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/flit-2.1.0-lbkrpmmiwatvlyjllak5w7oycyakujjz
23: flux-sched /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/flux-sched-0.19.0-azlepgnf4x3szj74ttgx5aqtzbyl5gxa
24: fortrilinos /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/fortrilinos-2.0.0-cg346iqfzjupsa37whvn4tivpbjbxnd
25: gasnet /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/gasnet-2021.9.0-vov6viiwltjtd2xdcjebkcuyd22yk4f
26: ginkgo /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/ginkgo-1.4.0-isjktvkudr65wmarjrdrep2c3phyu6d2
27: globalarrays /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/globalarrays-5.8-ue7lygmoqeznri4zonekhhkgc7qo46xdb
28: gotcha /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/gotcha-1.0.3-nyelkzozoqa4ca4lug5wj12jkhibrvpq
29: hdf5 /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/hdf5-1.12.1-dscpp3b5u3k3nusfoh3d4zvc2fdbndqm
30: heffte /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/heffte-2.2.0-cbijfxgg77w3nfpri4szl2mghl7lrnhs
31: hpctoolkit /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/hpctoolkit-2021.10.15-racjlvz2z3dl3eulm7ybh6nmjwjghja
32: hpx /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/hpx-1.7.1-wtti5py323torlm5o7g6bfrgrh4bo6d4
33: hypre /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/hypre-2.23.0-q5zfpxlieceq4sqsu6433hunaa7sqvbz
34: kokkos /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/kokkos-3.4.01-7bopbt2jv34cvnucpmbfw3njpggotwll
35: kokkos-kernels /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/kokkos-kernels-3.4.01-xhxholrzepfvxkiaeqmwiylbjxd4daa
36: legion /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/legion-21.03.0-t6fsvautw2h6cbv4meab3phbssebolnm
37: libnrm /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/libnrm-0.1.0-jsse7qvcjj4opsa7avql2dkogwqzmk5m
38: libquo /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/libquo-1.3.1-klnddbwro2x46jfc2ystw5sm6ds43cvl
39: loki /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/loki-0.1.7-ggwkwzphjztzezp5x2fnimeesu5i6un
40: magma /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/magma-2.6.1-df5ncmusf6viglrdfo6ladkyltxgcxe
41: mercury /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/mercury-2.0.1-nblhnp02yjt4nj572uq5vkkzlwzbed5
42: metall /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/metall-0.17-7fomntjjbwhldxq5hfvoc5vmfngp6t
43: mfem /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/mfem-4.3.0-lbm2ladjftanl5qbu5orcfv3u5zrm
44: mpark-variant /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/mpark-variant-1.4.0-xyf5xrvdszmtlswk35ayonajo2falqg5
45: mpich /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/mpich-3.4.2-i2roe5wfv4uhnwbquzxc4rvhx3uqev
```

- 91 E4S products
- Ubuntu v18.04 ppc64le
- Support for GPUs
 - NVIDIA CUDA
 - NVHPC 21.9

E4S 21.11 ppc64le Singularity image

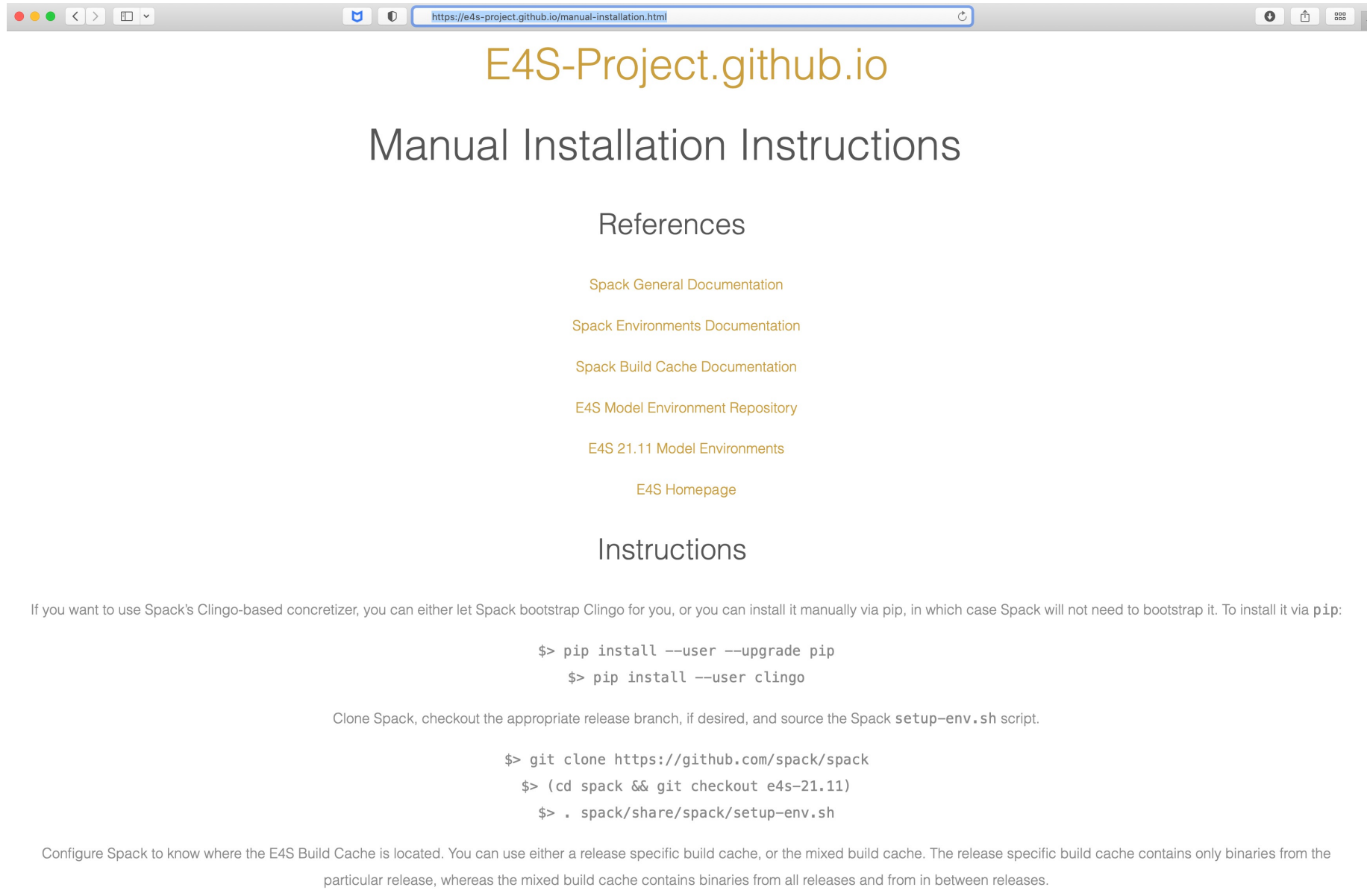
```
46: mpifileutils /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/mpifileutils-0.11-ajx7675xid7lvcfk4u4ifbunshdqz7k
47: netlib-scalapack /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/netlib-scalapack-2.1.0-xn73q57pjteeundik4shoezrlo2g6mrg
48: ninja /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/ninja-1.10.2-txpjvbtkr7ovnuoluobagoqgn5gabg3d
49: nrm /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/nrm-0.1.0-yyrb64omok3tyqh6gzolo3k3h54y5rj
50: omega-h /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/omega-h-9.34.1-gaulvevjnjqawi6fbazyknuqfinffnjw
51: openpmd-api /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/openpmd-api-0.14.3-mnziagkceftx7wm3kwzc4pk7dmkrkg5q
52: openmpi /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/openmpi-4.1.1-uw4owrxv26x3ygr5q7udhme3f reqwmzl
53: papi /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/papi-6.0.0.1-ehedapozusx3i7lfpichari5atqvmh74
54: papyrus /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/papyrus-1.0.1-dl6ak3mnzzltiwusuriolnfl5ksz2wxw
55: parallel-netcdf /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/parallel-netcdf-1.12.2-nxbqhe3qkzdxu6o4hsk2vqnpq3mswjq
56: paraview /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/paraview-5.9.1-xixczmgqgnhdx2x5dyzgp532zua2jwow
57: parsec /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/parsec-3.0.2012-h2m2judrwxigevr6q3j7wnrqct67sfh
58: pdt /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/pdt-3.25.1-dfzobkfuiqcpxae5hnfezqm6gpqi3wk
59: petsc /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/petsc-3.16.1-vtj fjia2amthfdc5hbqphy5l7snp2i4
60: plasma /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/plasma-21.8.29-xdwx3zrgusitrac72mqkurknhrsbzof
61: precice /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/precice-2.3.0-mxwok2fd6meuzcv6v5lmd5bv4zpuqrk5
62: pumi /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/pumi-2.2.6-b7ydidbb45jo3kkced2kjahpnqtg4qti
63: py-jupyterhub /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/py-jupyterhub-1.4.1-35l5htiyp6a6azpehogjt4vf2f2no67
64: py-libensemble /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/py-libensemble-0.8.0-f27asumkzcgzbzxhnrknsyoyxy3sfpql
65: py-parsl /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/py-parsl-1.1.0-e3ge67qfbnhto57ubonckxoywezsqya
66: py-radical-saga /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/py-radical-saga-1.8.0-lbuszbgvc3ibbqwhrldcurhpkloroco7f
67: py-radical-pilot /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/py-radical-pilot-1.8.0-wkjkq2v2dpsvapay7emxj2jtaif2f4
68: qthreads /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/qthreads-1.16-kcir2bkoatobn4e2qz7fmcrrfs7pgn4v
69: raja /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/raja-0.14.0-ns3dxwqr5fbufgvhyxqe3ydi6ip7mbr
70: rempi /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/rempi-1.1.0-ib2lnlqhr3zvmrnrbgtgbcujfnw6vzv
71: scr /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/scr-3.0rc2-gb3auatilui4yrlo4cjpgvhabwve254id
72: slate /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/slate-2021.05.02-wb4vynciraa7dqksegnhvkv7kx64frhy
73: slepc /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/slepc-3.16.0-hgn6jvzk2oo5q5cdiybvuiurjmmvdf2k
74: strumpack /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/strumpack-6.1.0-i7t4sy35etpvmzajlyljvp4ncgf3g5
75: sundials /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/sundials-5.8.0-q4wq3fsvsa7ml3xjstb3nmsc4sb2pdb7
76: superlu-dist /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/superlu-dist-7.1.1-hft52tkp3cbvl7c6ushtpp566iad72qk
77: stc /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/stc-0.9.0-w2ubukpjo7ouvf5wrxmwxvkm225nsx7
78: swig /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-11.1.0/swig-4.0.2-trlf7zpbptp7vx66s5dsy2ujx57lt6qne
79: sz /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/sz-2.1.12-n5wgbtryijanb6p6qz7p36daq4y2mce
80: tasmanian /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/tasmanian-7.7-i6urkzufeppqw6yypgz2upj2j2iwbpghi
81: tau /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/tau-2.31-cegfgg37nxemdsio6c2jxr3knu54njdr
82: trilinos /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/trilinos-13.2.0-7tgdn7m6rhcct4jxuwujinkhu6as54sw
83: turbine /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/turbine-1.3.0-ur5he6cmg73k6dolxsba5vfaunceua
84: umap /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/umap-2.1.0-7sqkyikt6qkgfbgngwbjwy2ia47cc5d
85: umpire /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/umpire-6.0.0-qy2li7mkl4wgbhplga6gqudrw3pl64mw
86: unifyfs /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/unifyfs-0.9.1-xdusd5vqnurbrl3priwyjutxbq3cpki
87: upcxx /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/upcxx-2021.9.0-nb32n2wmpjqos77untzfkfte15426e4o
88: veloc /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/veloc-1.5-tl435lrbllqcwj46hq32aan6frqmoq5gi
89: vtk-m /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/vtk-m-1.6.0-yw4rayrgc3foebzaunuptat4urdu5js3
90: warpx /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/warpx-21.11-5vf3w65haj2jydmr34bcjhxs4u4oce25
91: zfp /spack/opt/spack/linux-ubuntu18.04-ppc64le/gcc-7.5.0/zfp-0.5.5-o2thmry2kturpuoiprs75wjmlieix7b
```

E4S Download from https://e4s.io



The screenshot shows a web browser window with the URL <https://e4s-project.github.io/download.html>. The page features a navigation bar with the E4S logo and links for HOME, EVENTS, ABOUT, E4S PRODUCT DOCPORTAL, E4S COMMUNITY POLICIES, CONTACT US, JOIN E4S, and FAQ. A prominent orange button labeled "DOWNLOAD" is visible in the top right of the navigation bar. The main content area has a large heading: "Extreme-scale Scientific Software Stack (E4S) version 21.11". Below this, a paragraph of text describes the software stack. A blue box highlights the link "E4S Manual Installation Instructions." Other links include "E4S v21.11 Notes." and "E4S Container Installation Instructions." A second heading, "Using E4S Containers", is followed by text about container offerings and links to the "E4S Docker Hub", "E4S GitHub repository", and "E4S Build Cache".

E4S 21.11 bare-metal installation



The screenshot shows a web browser window with the address bar containing `https://e4s-project.github.io/manual-installation.html`. The page title is "E4S-Project.github.io" and the main heading is "Manual Installation Instructions". Below the heading is a "References" section with links to "Spack General Documentation", "Spack Environments Documentation", "Spack Build Cache Documentation", "E4S Model Environment Repository", "E4S 21.11 Model Environments", and "E4S Homepage". The "Instructions" section begins with the text: "If you want to use Spack's Clingo-based concretizer, you can either let Spack bootstrap Clingo for you, or you can install it manually via pip, in which case Spack will not need to bootstrap it. To install it via pip:" followed by terminal commands: `$> pip install --user --upgrade pip` and `$> pip install --user clingo`. Below this is the instruction: "Clone Spack, checkout the appropriate release branch, if desired, and source the Spack `setup-env.sh` script." followed by terminal commands: `$> git clone https://github.com/spack/spack`, `$> (cd spack && git checkout e4s-21.11)`, and `$> . spack/share/spack/setup-env.sh`. The final instruction is: "Configure Spack to know where the E4S Build Cache is located. You can use either a release specific build cache, or the mixed build cache. The release specific build cache contains only binaries from the particular release, whereas the mixed build cache contains binaries from all releases and from in between releases."

E4S 21.11 bare-metal installation spack.yaml recipe

```
30 elfutils:
31   variants: +bzip2 ~nls +xz
32   fftw:
33     variants: +openmp
34   hdf5:
35     variants: +fortran +hl +shared api=v18
36   version:
37     - 1.12.1
38   libfabric:
39     variants: fabrics=sockets,tcp,udp,rxm
40   libunwind:
41     variants: +pic +xz
42   mesa:
43     variants: ~llvm
44   mesa18:
45     variants: ~llvm
46   mpich:
47     variants: ~wrapperrpath
48   ncurses:
49     variants: +termlib
50   openblas:
51     variants: threads=openmp
52   trillinos:
53     variants: +amesos +amesos2 +anasazi +aztec +belos +boost +epetra +epetraext
54     +ifpack +ifpack2 +intrepid +intrepid2 +isorropia +kokkos +ml +minitensor +muelu
55     +nox +piro +phalanx +rol +rhythm +sacado +stk +shards +shylu +stokhos +stratimikos
56     +teko +tempus +tpetra +trilinoscouplings +zoltan +zoltan2 +superlu-dist gotype=long_long
57   xz:
58     variants: +pic
59
60 definitions:
61 - cuda_specs:
62   - amrex@21.11 +cuda cuda_arch=80
63   - caliper@2.7.0 +cuda cuda_arch=80
64   - chai@2.4.0 ~benchmarks ~tests +cuda cuda_arch=80 ^umpire ~shared
65   - flecsi@2.1.0 +cuda cuda_arch=80
66   - ginkgo@1.4.0 +cuda cuda_arch=80
67   - heffte@2.2.0 +cuda cuda_arch=80
68   - hpx@1.7.1 +cuda cuda_arch=80
69   - hypre@2.23.0 +cuda cuda_arch=80
70   - kokkos@3.4.01 +wrapper +cuda cuda_arch=80
71   - kokkos-kernels@3.4.01 +cuda cuda_arch=80 ^kokkos +wrapper +cuda cuda_arch=80
72   - magma@2.6.1 +cuda cuda_arch=80
73   - mfem@4.3.0 +cuda cuda_arch=80
74   - parsec@3.0.2012 +cuda cuda_arch=80
75   - petsc@3.16.1 +cuda cuda_arch=80
76   - raja@0.14.0 +cuda cuda_arch=80
77   - slate@2021.05.02 +cuda cuda_arch=80
78   - slepc@3.16.0 +cuda cuda_arch=80
79   - strumpack@6.1.0 ~slate +cuda cuda_arch=80
80   - sundials@5.8.0 +cuda cuda_arch=80
81   - superlu-dist@7.1.1 +cuda cuda_arch=80
82   - tasmanian@7.7 +cuda cuda_arch=80
83   - trillinos@13.2.0 +cuda cuda_arch=80
84   - umpire@6.0.0 ~shared +cuda cuda_arch=80
85   - upcxx@2021.9.0 +cuda
86   - vtk-m@1.6.0 +cuda cuda_arch=80
87   - zfp@0.5.5 +cuda cuda_arch=80
```

- E4S products built with CUDA for A100
- Built with ROCm
- Built with oneAPI

E4S: Spack Build Cache at U. Oregon to speed up installation

E4S Build Cache for Spack 0.17.0

To use this build cache, just add it to your Spack

```
spack mirror add E4S https://cache.e4s.io
spack buildcache keys -it
```

**** PLEASE ALLOW A FEW MINUTES FOR THE INVENTORY TO LOAD ****

Click on one of the packages below to see a list of all available variants.

All Architectures PPC64LE X86_64

All Operating Systems Centos 7 Centos 8 RHEL 7 RHEL 8 Ubuntu 18.04 Ubuntu 20.04 Amazon Linux 2

Last updated: 11-10-2021 16:59 PDT

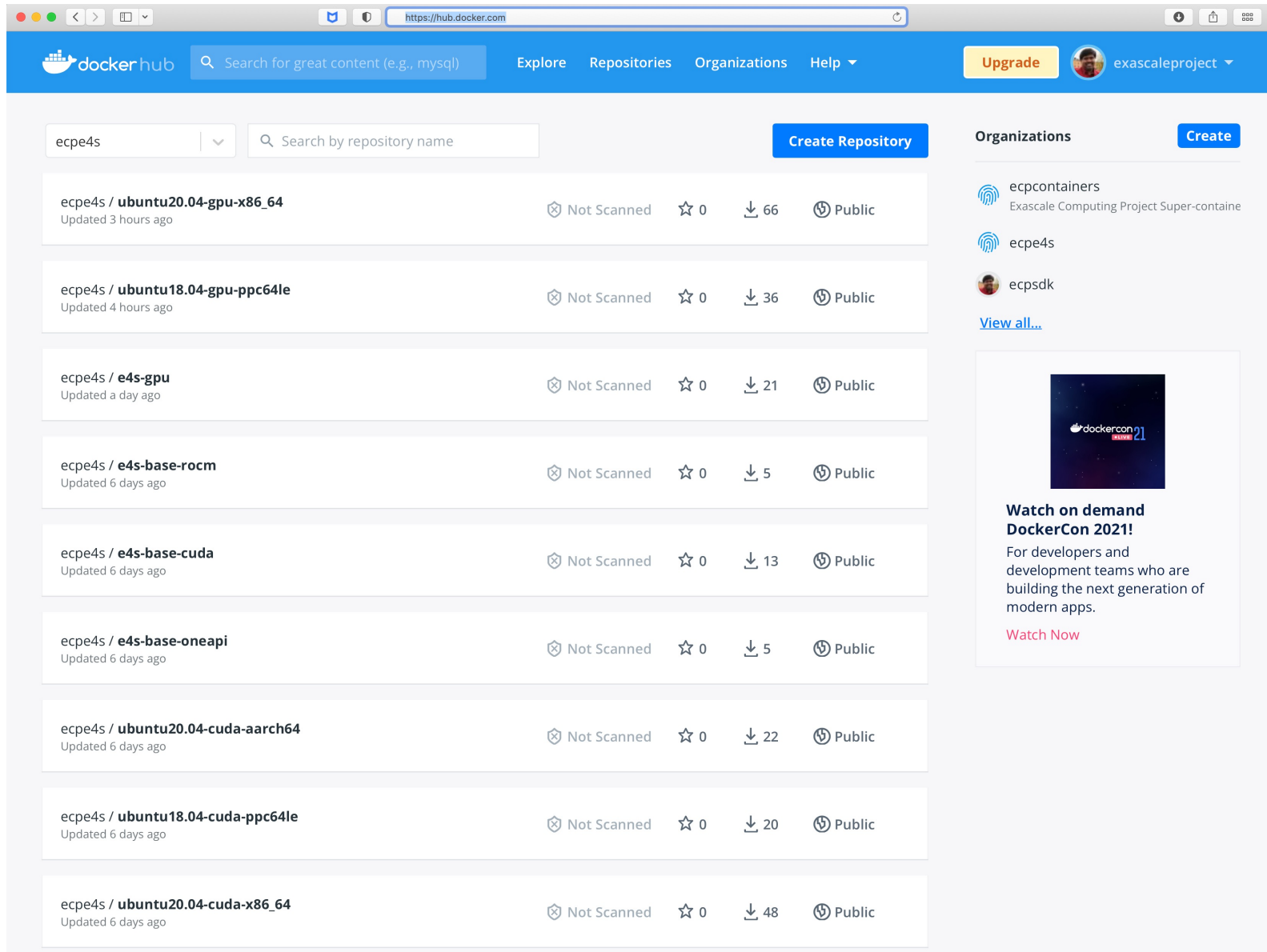
77,606 Spack packages

adiak@0.1.1 adiak@0.2.1 adios2@2.5.0 adios2@2.6.0 adios2@2.7.0 adios2@2.7.1 adios@1.13.1 adlbx@0.9.2 adlbx@1.0.0 adol-c@2.7.2 amg@1.2 aml@0.1.0 amr-wind@ascent
amr-wind@main amrex@20.07 amrex@20.09 amrex@20.10 amrex@20.11 amrex@20.12 amrex@21.01 amrex@21.02 amrex@21.03 amrex@21.04 amrex@21.05 ant@1.10.0 ant@1.10.7
arborx@0.9-beta arborx@1.0 argobots@1.0 argobots@1.0rc1 argobots@1.0rc2 argobots@1.1 arpack-ng@3.7.0 arpack-ng@3.8.0 ascent@0.6.0 ascent@0.7.0 ascent@0.7.1 ascent@develop
ascent@pantheon_ver assimp@4.0.1 assimp@5.0.1 autoconf-archive@2019.01.06 autoconf@2.69 autoconf@2.70 automake@1.16.1 automake@1.16.2 automake@1.16.3 axl@0.1.1 axl@0.3.0
axl@0.4.0 axom@0.3.3 axom@0.4.0 axom@0.5.0 bash@5.0 bdfpcf@1.0.5 berkeley-db@18.1.40 berkeley-db@6.2.32 binutils@2.31.1 binutils@2.32 binutils@2.33.1 binutils@2.34
bison@3.4.2 bison@3.6.4 bison@3.7.4 bison@3.7.6 blaspp@2020.10.02 blaspp@2021.04.01 blt@0.3.6 blt@0.3.6rocm blt@0.4.0 blt@develop bmi@develop bmi@main bolt@1.0
bolt@1.0rc2 bolt@1.0rc3 bolt@2.0 boost@1.68.0 boost@1.70.0 boost@1.72.0 boost@1.73.0 boost@1.74.0 boost@1.75.0 boost@1.76.0 butterflypack@1.1.0 butterflypack@1.2.0
butterflypack@1.2.1 byacc@master bzip2@1.0.6 bzip2@1.0.8 c-blosc@1.17.0 c-blosc@1.21.0 cabana@0.3.0 cairo@1.16.0 caliper@2.0.1 caliper@2.2.0 caliper@2.3.0 caliper@2.4.0
caliper@2.5.0 camp@0.1.0 camtimers@master catalyst@5.6.0 chai@2.3.0 charliecloud@0.22 cinch@develop cinch@master cmake@3.13.4 cmake@3.14.5 cmake@3.14.7 cmake@3.15.4
cmake@3.16.2 cmake@3.16.5 cmake@3.17.1 cmake@3.17.3 cmake@3.18.0 cmake@3.18.1 cmake@3.18.2 cmake@3.18.4 cmake@3.19.0 cmake@3.19.2 cmake@3.19.5 cmake@3.19.7
cmake@3.20.0 cmake@3.20.1 cmake@3.20.2 codar-cheetah@develop comgr@3.9.0 comgr@4.0.0 comgr@4.1.0 comgr@4.2.0 conduit@0.6.0 conduit@0.7.1 conduit@0.7.2 conduit@develop
conduit@master coupler@master cpio@2.13 cub@1.12.0-rc0 cube@4.6 cubelib@4.6 cubew@4.5 cuda@10.1.243 cuda@10.2.89 cuda@11.0.2 cuda@11.1.0 cuda@11.1.1 cuda@11.2.0
cuda@11.2.1 cuda@11.2.2 cuda@11.3.0 curl@7.63.0 curl@7.71.0 curl@7.72.0 curl@7.73.0 curl@7.74.0 curl@7.75.0 curl@7.76.0 darshan-runtime@3.1.7 darshan-runtime@3.1.8
darshan-runtime@3.2.1 darshan-runtime@3.3.0 darshan-util@3.1.7 darshan-util@3.1.8 darshan-util@3.2.1 darshan-util@3.3.0 dbus@1.12.8 diffutils@3.7 double-conversion@2.0.1 doxygen@1.8.15
doxygen@1.8.20 doxygen@1.9.1 dtcmp@1.1.0 dtcmp@1.1.1 dyninst@10.1.0 dyninst@10.2.0 dyninst@10.2.1 dyninst@11.0.0 effis@develop eigen@3.3.7 eigen@3.3.8 eigen@3.3.9

- 75,000+ binaries
- S3 mirror
- No need to build from source code!

• <https://oaciss.uoregon.edu/e4s/inventory.html>

E4S Base Container Images for x86_64, ppc64le, and aarch64



The screenshot shows the Docker Hub interface for the 'ecpe4s' organization. The main content area displays a list of repository images with their respective architectures, update times, scan status, star counts, download counts, and visibility settings. The right sidebar shows the organization's profile and a promotional banner for DockerCon 2021.

Repository	Architecture	Updated	Not Scanned	Stars	Downloads	Visibility
ecpe4s / ubuntu20.04-gpu-x86_64	x86_64	Updated 3 hours ago	Not Scanned	0	66	Public
ecpe4s / ubuntu18.04-gpu-ppc64le	ppc64le	Updated 4 hours ago	Not Scanned	0	36	Public
ecpe4s / e4s-gpu	x86_64	Updated a day ago	Not Scanned	0	21	Public
ecpe4s / e4s-base-rocm	x86_64	Updated 6 days ago	Not Scanned	0	5	Public
ecpe4s / e4s-base-cuda	x86_64	Updated 6 days ago	Not Scanned	0	13	Public
ecpe4s / e4s-base-oneapi	x86_64	Updated 6 days ago	Not Scanned	0	5	Public
ecpe4s / ubuntu20.04-cuda-aarch64	aarch64	Updated 6 days ago	Not Scanned	0	22	Public
ecpe4s / ubuntu18.04-cuda-ppc64le	ppc64le	Updated 6 days ago	Not Scanned	0	20	Public
ecpe4s / ubuntu20.04-cuda-x86_64	x86_64	Updated 6 days ago	Not Scanned	0	48	Public

- Hub.docker.com
- ecpe4s
- Platforms:
 - x86_64
 - Ppc64le
 - aarch64
- GPU runtimes:
 - Cuda
 - ROCm
 - oneAPI

E4S 21.11 Cloud, CI, and Custom images

The screenshot shows a web browser window displaying the GitHub repository for 'e4s-project'. The page is titled 'Continuous Integration Images' and contains the following sections:

- Continuous Integration Images**
 - These are barebones operating system images which contain only essential build tools and python packages needed by Spack.
 - These images are intended to be used in continuous integration workflows where Spack is first cloned and then used to build and test software.
 - X86_64**
 - [ecpe4s/rhel7-runner-x86_64](#)
 - [ecpe4s/rhel8-runner-x86_64](#)
 - [ecpe4s/ubuntu18.04-runner-x86_64](#)
 - [ecpe4s/ubuntu20.04-runner-x86_64](#)
 - PPC64LE**
 - [ecpe4s/rhel7-runner-ppc64le](#)
 - [ecpe4s/rhel8-runner-ppc64le](#)
 - [ecpe4s/ubuntu18.04-runner-ppc64le](#)
 - [ecpe4s/ubuntu20.04-runner-ppc64le](#)
- Custom Images**
 - [ecpe4s/ubuntu1804_aarch64_waggle](#)
 - [ecpe4s/superlu_sc](#)
- E4S Facility Deployment**
 - [NERSC](#)
 - [OLCF](#)
- AWS EC2 Image**
 - The E4S 21.11 release is also available on [AWS](#) as an EC2 AMI with ID `ami-0db9d49091db1c25f` in the US-West-2 (Oregon) region.

E4S 21.11 AWS image: US-West2 (OR) ami-0db9d49091db1c25f

The screenshot displays a Linux desktop environment with the following components:

- ParaView 5.9.0:** A 3D visualization of a mesh with a color scale for pressure, ranging from $0.0e+00$ to $1.2e-38$.
- TAU ParaProf Statistics:** A table showing performance metrics for various components.

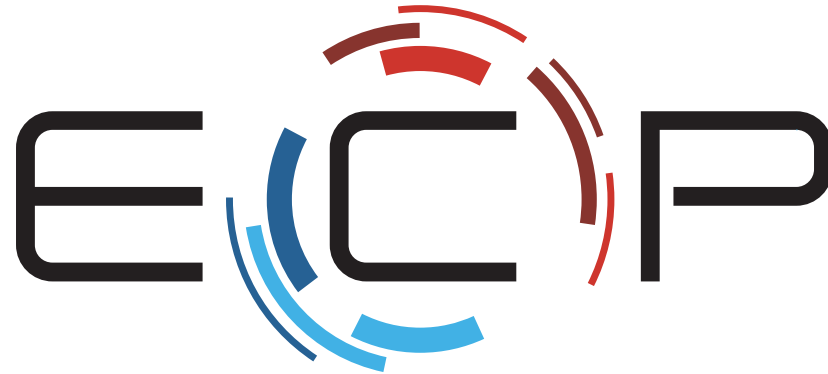
Name	Exclusive TIME	Inclusive TIME
.TAU application	8.784	218.852
Belos: Operation Op*x	0.629	0.706
Belos: PseudoBlockGmresSolMgr total solve time	0.615	65.591
Belos: ICGS[2]: Orthogonalization	0.22	18.854
Belos: Operation Op*x	1.672	2.32
Belos: Operation Prec*x	7.617	43.327
Ifpack2::Chebyshev::apply	4.76	25.865
Kokkos::parallel_for Kokkos::View::initialization [DualV	0.003	0.003
Kokkos::parallel_for Kokkos::View::initialization [MV::D	0.004	0.004
Kokkos::parallel_for Kokkos::View::initialization [export	0.002	0.002
Kokkos::parallel_for Kokkos::View::initialization [import	0.002	0.002
- Terminal:** Shows the output of the Singularity module command, listing various software modules available in the environment, including ParaView 5.9.1-s6m and amrex/21.11-rocm-6cm.

- E4S 21.11 AWS
- Intel oneAPI
 - CUDA
 - NVHPC
 - ROCm
 - AWS DCV
 - Spack Build Cache
 - ECP: Nalu-Wind
 - OpenFOAM
 - ParaView
 - TAU
 - Docker
 - Shifter
 - Charliecloud
 - E4S Singularity...

Thank you

<https://www.exascaleproject.org>

This research was supported by the Exascale Computing Project (17-SC-20-SC), a joint project of the U.S. Department of Energy's Office of Science and National Nuclear Security Administration, responsible for delivering a capable exascale ecosystem, including software, applications, and hardware technology, to support the nation's exascale computing imperative.



EXASCALE COMPUTING PROJECT

Thank you to all collaborators in the ECP and broader computational science communities. The work discussed in this presentation represents creative contributions of many people who are passionately working toward next-generation computational science.