

- Server: 129.74.246.122
- Login: daspos
- Password: daspos1

Quick start: bertini software

- `wget -O bertini.umbrella \`
- <https://curate.nd.edu/downloads/b2773t9694n>
- `sudo umbrella --spec bertini.umbrella \`
- `--localdir /tmp/umbrella_cache/ \`
- `--output`
`"/tmp=/tmp/umbrella_cache/bertini_output" \`
- `--sandbox_mode docker \`
- `--log umbrella.log \`
- `run`

Umbrella

- **Tracking execution environment**
 - Umbrella Specification
- **Creating execution environment**
 - Umbrella Execution Engine
- **Preserving execution environment**
 - Umbrella Archiver

Umbrella Specification

Sections:

Hardware

Kernel

OS

Software

Data

Environment variables

CMD

Output

```
{
  "description": "A ray-tracing application which creates video frames.",
  "hardware": {
    "arch": "x86_64",
    "cores": "4",
    "memory": "1GB",
    "disk": "3GB"
  },
  "kernel": {
    "name": "linux",
    "version": ">=2.6.18"
  },
  "os": {
    "name": "redhat",
    "version": "6.5",
    "mountpoint": "/",
    "source": [ "http://ccl.cse.nd.edu/.../redhat-6.5-x86_64.tar.gz" ],
    "format": "tgz",
    "action": "unpack",
    "checksum": "669ab5ef94af84d273f8f92a86b7907a",
    "size": "633848940",
    "uncompressed_size": "1743656960",
    "ec2": {
      "ami": "ami-2cf8901c",
      "region": "us-west-2",
      "user": "ec2-user"
    }
  },
  "software": {
    "povray-3.6.1-redhat6-x86_64": {
      "mountpoint": "/software/povray-3.6.1-redhat6-x86_64",
      "source": [ "http://ccl.cse.nd.edu/.../povray-3.6.1-redhat6-x86_64.tar.gz" ],
      "format": "tgz",
      "action": "unpack",
      "checksum": "b02ba86dd3081a703b4b01dc463e0499",
      "size": "1471452",
      "uncompressed_size": "3010560"
    }
  },
  "data": {
    "4_cubes.pov": {
      "mountpoint": "/tmp/4_cubes.pov",
      "source": [ "http://ccl.cse.nd.edu/.../4_cubes.pov" ],
      "format": "plain",
      "action": "none",
      "checksum": "c65266cd2b672854b821ed93028a877a",
      "size": "1757"
    },
    ...
  },
  "environ": {
    "PWD": "/tmp"
  },
  "cmd": "povray +l/tmp/4_cubes.pov +O/tmp/frame000.png +K.0 -H50 -W50",
  "output": {
    "files": [ "/tmp/frame000.png" ],
    "dirs": [ "/tmp/output" ]
  }
}
```

Resource URLs Supported by Umbrella

Resource	Example URL
Local Filesystem	/home/dthain/data/input
HTTP	http://www.data.com/data/file1
HTTPS	https://lab.cse.nd.edu/data/hep/file2
Amazon S3	s3+https://s3.aws.com/.../cubes.pov
Open Science Framework (OSF)	osf+https://files.osf.io/v1/.../7559c3a
Git Repository	git+https://github.com/.../cctools.git
CernVM File System	cvmfs://cvmfs/cms.cern.ch

Umbrella spec example

- {
- "cmd": "/software/bertini",
- "comment": "Bertini",
- "data": {
- "input": {
- "action": "None",
- "checksum": "5566c8dc820c2a2744f646abf662e34b",
- "format": "plain",
- "id": "5566c8dc820c2a2744f646abf662e34b",
- "mountpoint": "/tmp/input",
- "size": "197",
- "source": [
- "https://curate.nd.edu/downloads/8w32r496z2g"
-]
- }
- },

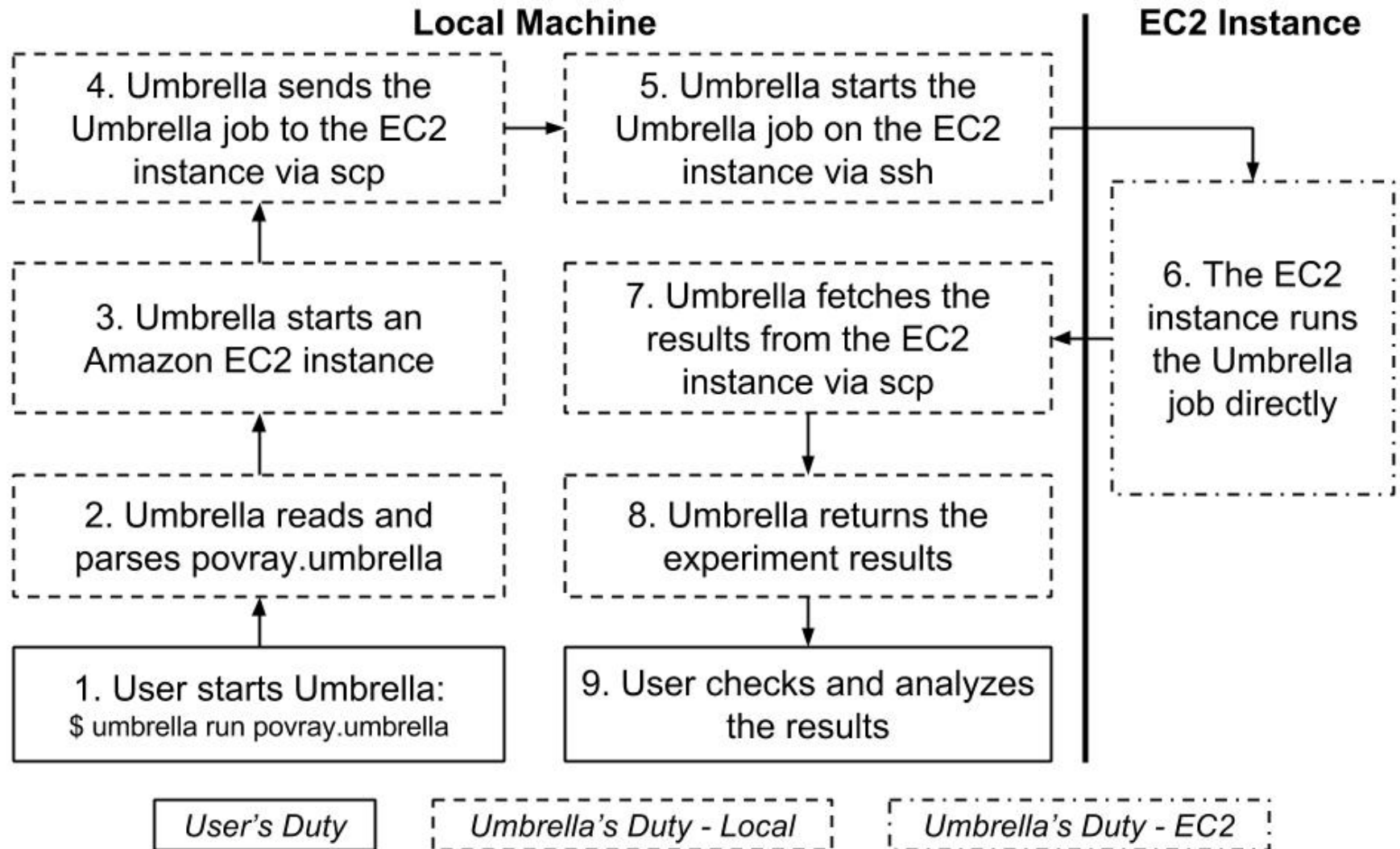
Umbrella Execution Engine

Matching degree between

- the execution node
- the execution environment specified via an Umbrella specification

Hardware	Kernel	OS	Sandbox Techniques
Yes	Yes	Yes	Utilize the current OS directly
Yes	Yes	No	OS-level Virtualization Docker, Parrot
Yes/No	No	No	Hardware Virtualization Local: VirtualBox, VMWare Remote: Amazon EC2

Umbrella EC2 Execution Engine

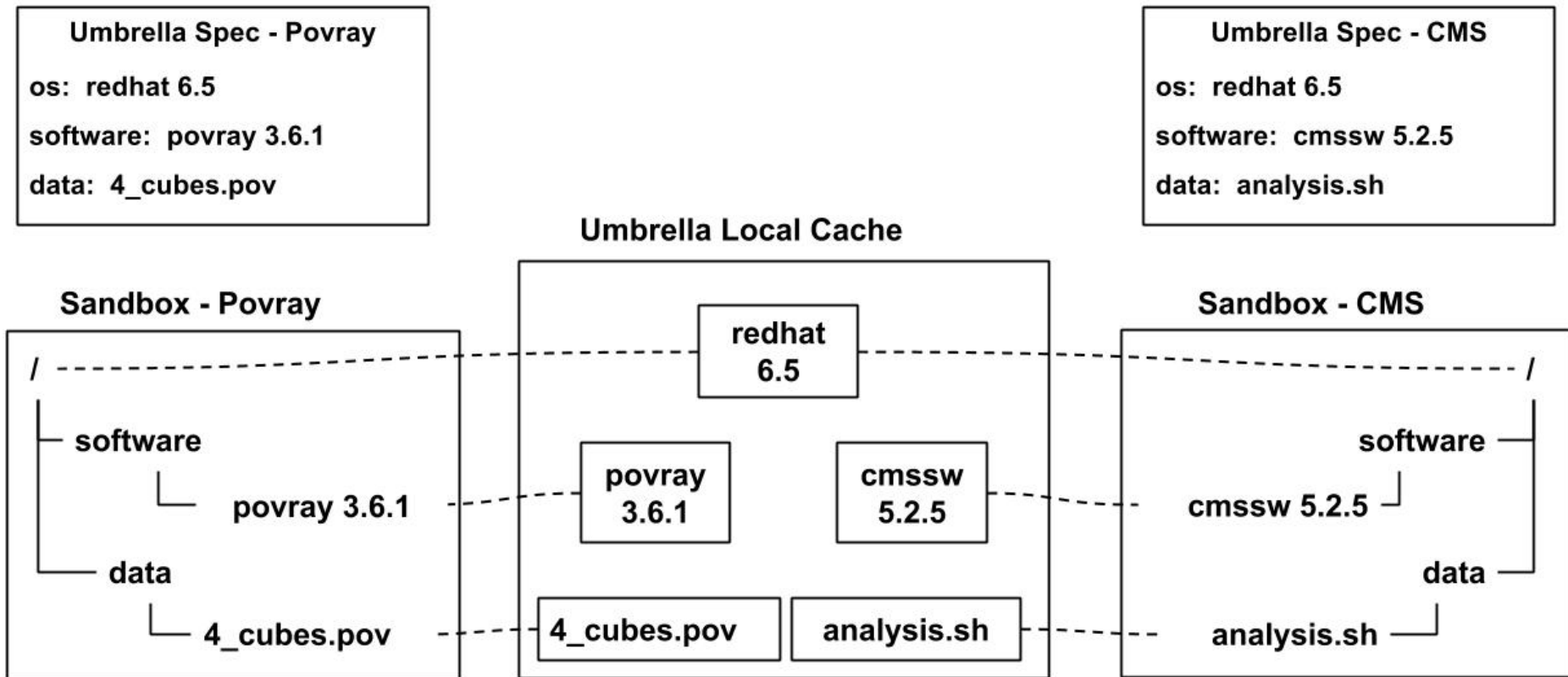


Example: parrot execution engine

- umbrella --spec bertini.umbrella\
– --localdir **/tmp/umbrella_cache_par/**
– --sandbox_mode parrot \
– run

Umbrella Local Cache

- OS-level virtualization



- [avyushko@stockpile demo1]\$ ls
/tmp/umbrella_cache/cache
5566c8dc820c2a2744f646abf662e34b
c2a2b68f8089209fc2454f3bc242b5d2
902703f016e0f930a870eaf9cb31640b

Umbrella Archiver

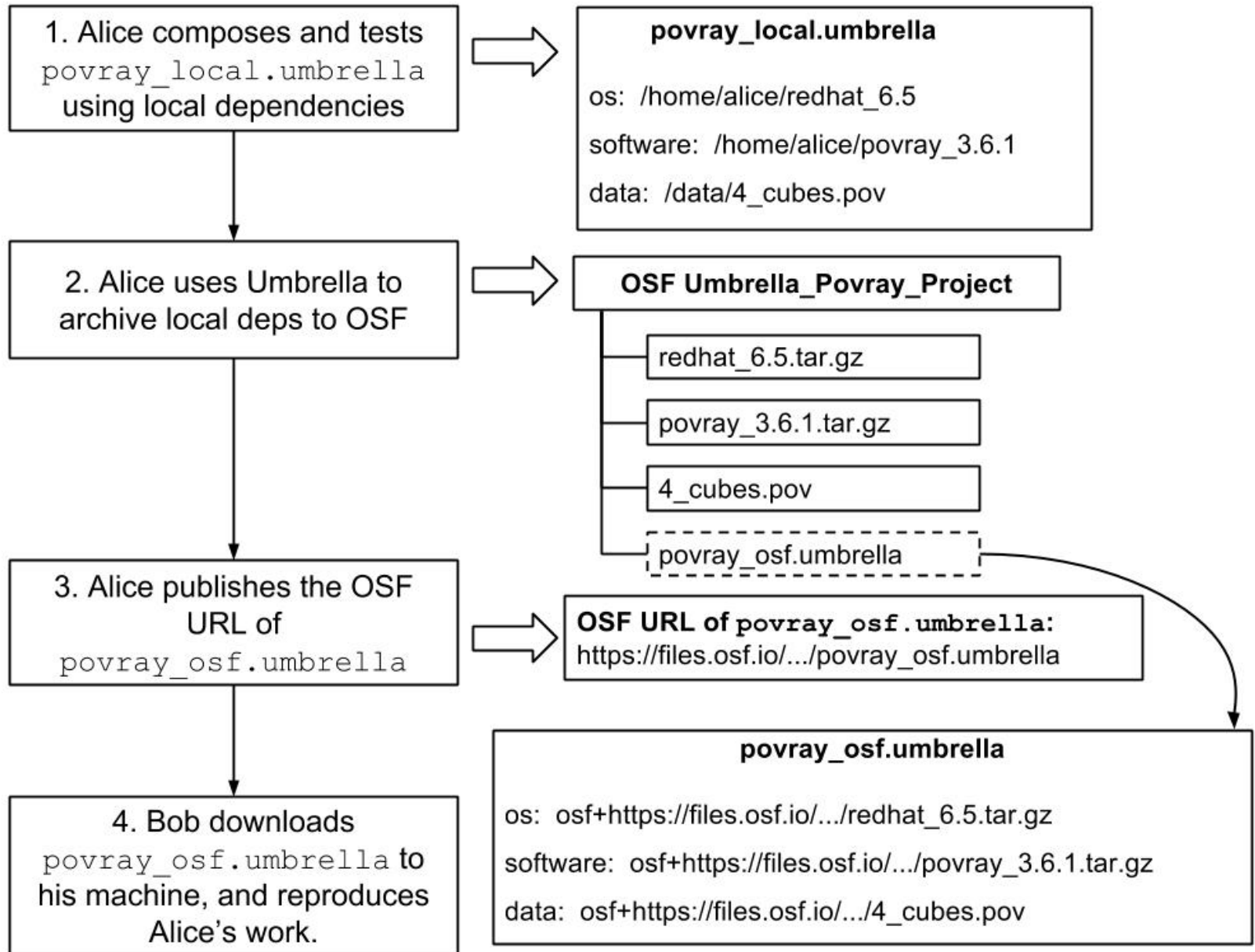
Two Categories of Unreliable Dependencies:

Local dependencies

Some third-party network dependencies

- Allows the user to mark unreliable deps
- Uploads the unreliable deps to reliable archive
 - Amazon S3
 - OSF storage service
- Allows the user to set the access permission of uploaded resources

Umbrella + OSF



- `umbrella --spec bertini.umbrella \`
`--localdir /tmp/umbrella_test/ \`
`--log umbrella.log \`
`--osf_userid=kh4n3 \`
`--osf_user=avyushko@nd.edu \`
`--osf_pass=<password> upload osf proj_bertini`
`public osf.umbrella`