

# Workshop – Installing Sandia Dakota on Windows and Red Hat Linux 7

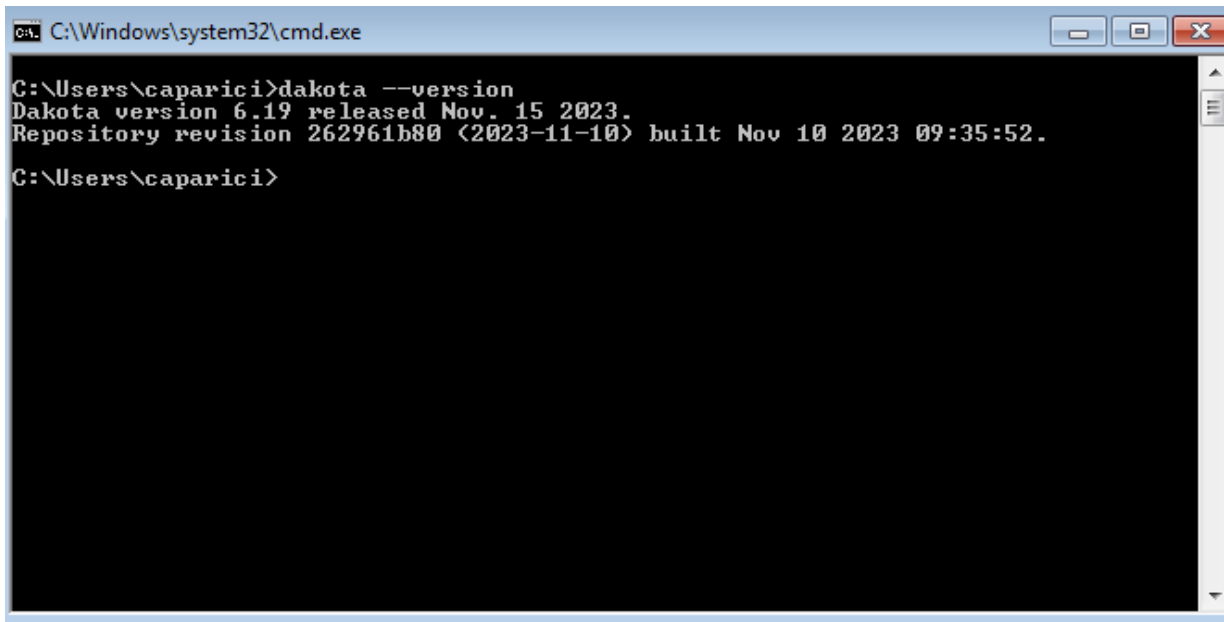
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AN MSC NASTRAN UNCERTAINTY QUANTIFICATION TUTORIAL

# Goal: Install Sandia Dakota on Windows and Red Hat Linux 7

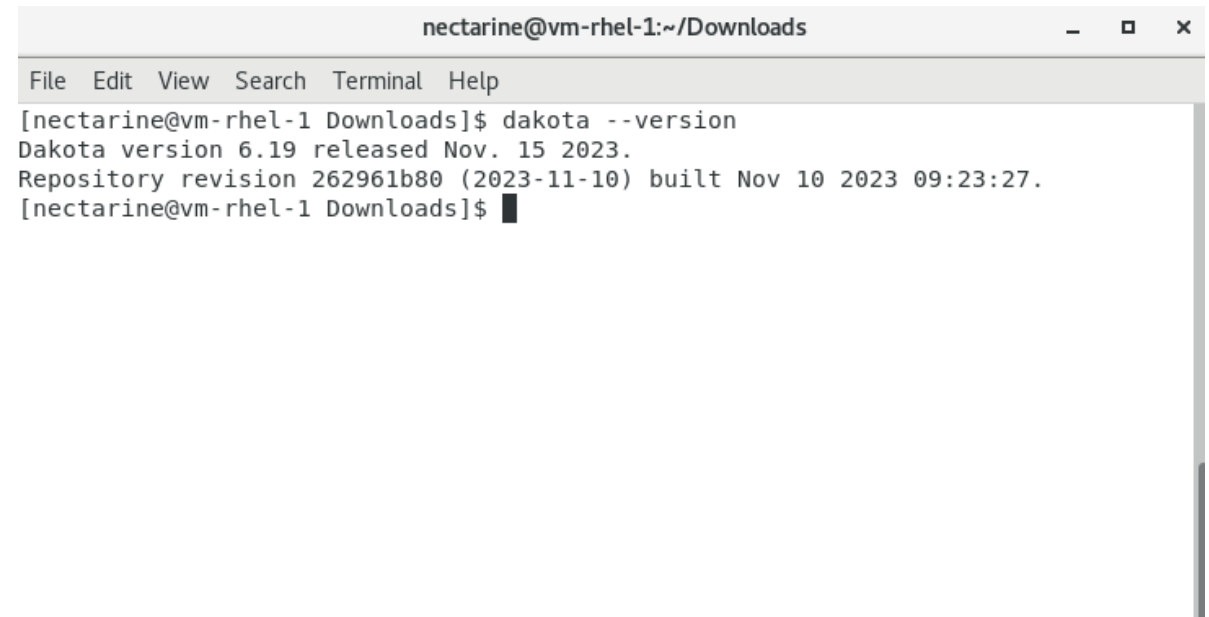
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## Windows



```
C:\Windows\system32\cmd.exe
C:\Users\caparici>dakota --version
Dakota version 6.19 released Nov. 15 2023.
Repository revision 262961b80 (2023-11-10) built Nov 10 2023 09:35:52.
C:\Users\caparici>
```

## Red Hat Linux 7



```
nectarine@vm-rhel-1:~/Downloads
File Edit View Search Terminal Help
[nectarine@vm-rhel-1 Downloads]$ dakota --version
Dakota version 6.19 released Nov. 15 2023.
Repository revision 262961b80 (2023-11-10) built Nov 10 2023 09:23:27.
[nectarine@vm-rhel-1 Downloads]$
```

# Contact me

- Nastran SOL 200 training
- Nastran SOL 200 questions
- Structural or mechanical optimization questions
- Access to the SOL 200 Web App

christian@ the-engineering-lab.com

# Tutorial

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# SOL 200 Web App Capabilities

The Post-processor Web App and HDF5 Explorer are free to MSC Nastran users.

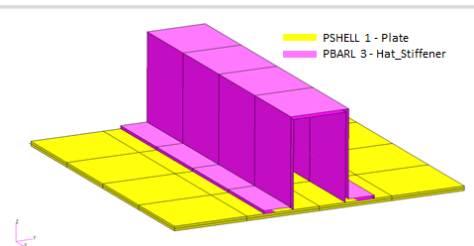
## Compatibility

- Google Chrome, Mozilla Firefox or Microsoft Edge
- Windows and Red Hat Linux
- Installable on a company laptop, workstation or server. All data remains within your company.

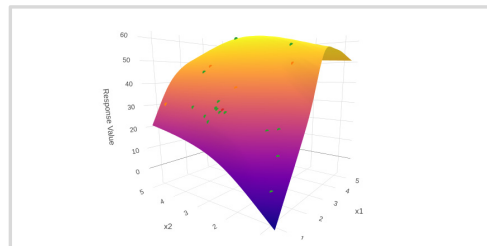
## Benefits

- REAL TIME error detection. 200+ error validations.
- REAL TIME creation of bulk data entries.
- Web browser accessible
- Free Post-processor web apps
- +80 tutorials

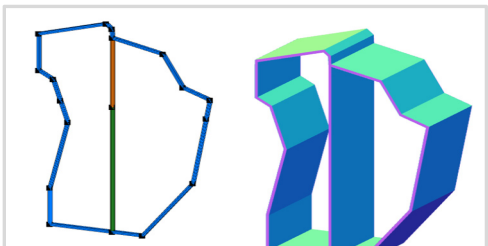
## Web Apps



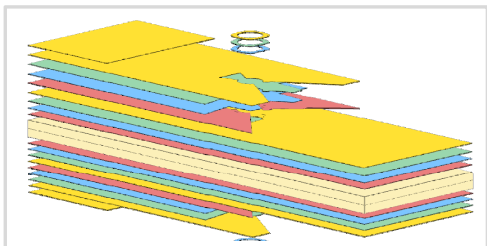
**Web Apps for MSC Nastran SOL 200**  
Pre/post for MSC Nastran SOL 200.  
Support for size, topology, topometry, topography, multi-model optimization.



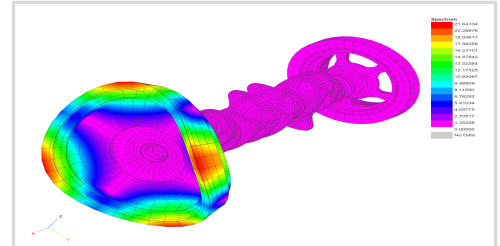
**Machine Learning Web App**  
Bayesian Optimization for nonlinear response optimization (SOL 400)



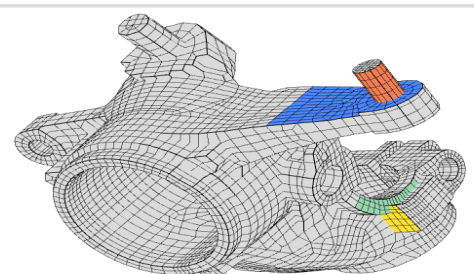
**PBMSECT Web App**  
Generate PBMSECT and PBRSECT entries graphically



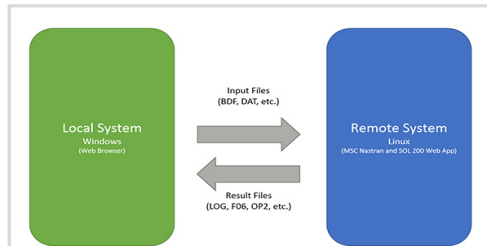
**Ply Shape Optimization Web App**  
Optimize composite ply drop-off locations, and generate new PCOMPG entries



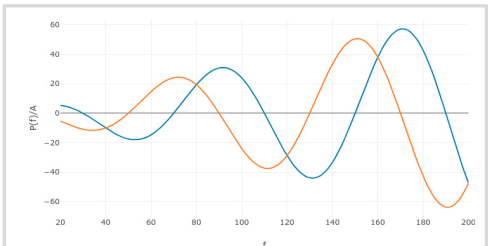
**Post-processor Web App**  
View MSC Nastran results in a web browser on Windows and Linux



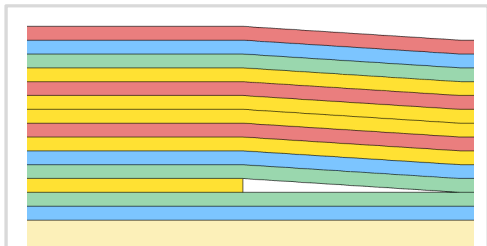
**Shape Optimization Web App**  
Use a web application to configure and perform shape optimization.



**Remote Execution Web App**  
Run MSC Nastran jobs on remote Linux or Windows systems available on the local network



**Dynamic Loads Web App**  
Generate RLOAD1, RLOAD2 and DLOAD entries graphically



**Stacking Sequence Web App**  
Optimize the stacking sequence of composite laminate plies



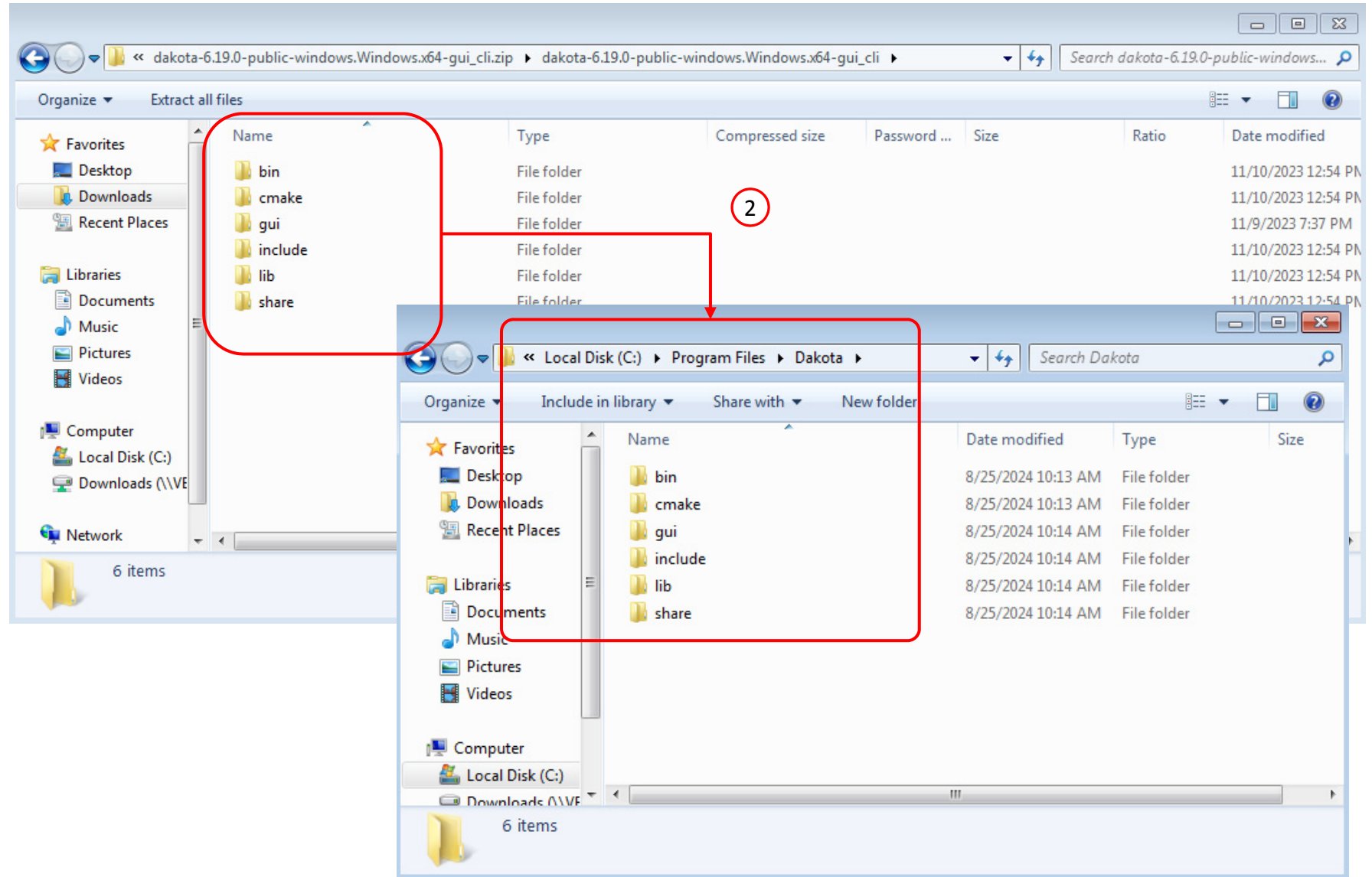
**HDF5 Explorer Web App**  
Create graphs (XY plots) using data from the H5 file

# Installing Sandia Dakota on Windows

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# Download Dakota on Windows

1. Click the indicated link to download Dakota
2. Extract the contents of the ZIP file to: C:\Program Files\Dakota



• By default, the Windows operating system limits paths to 256 characters. The original file names are very long and may exceed the 256 character limit, so use a shorter path when possible, e.g. C:\Program Files\Dakota.

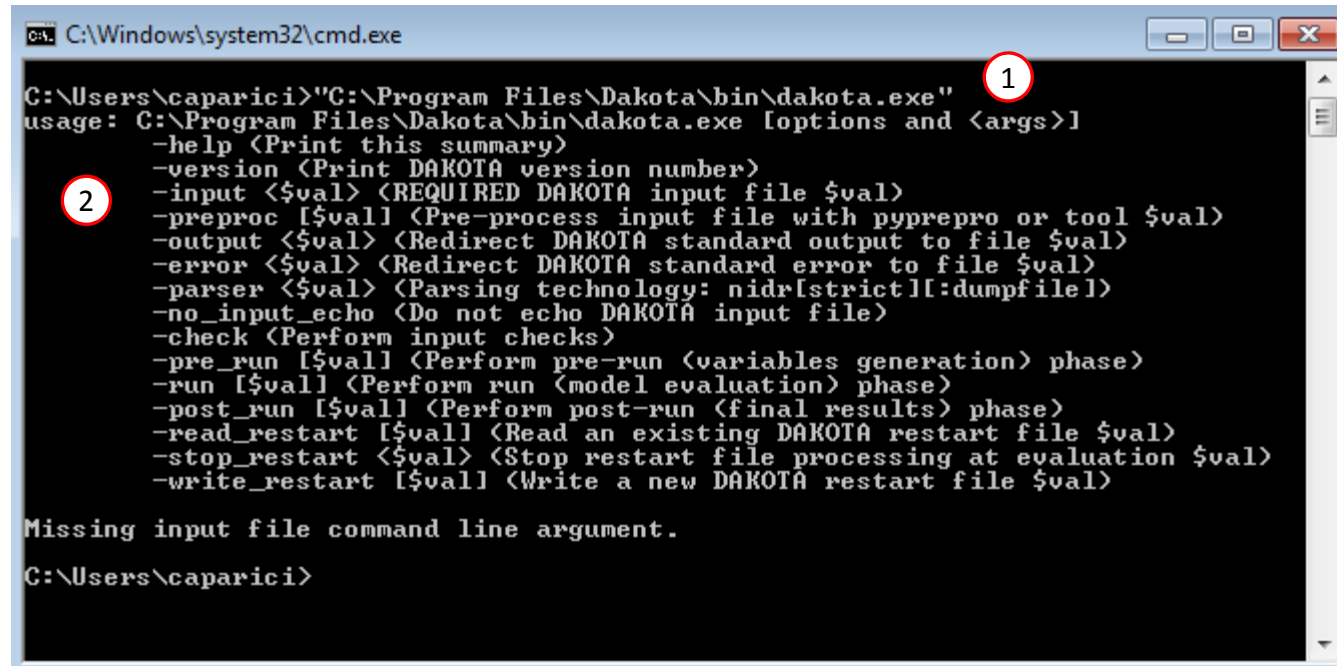
# Test Dakota

1. Run this in the command prompt:

"C:\Program Files\Dakota\bin\dakota.exe"

2. Dakota is successfully configured if the output appears as shown, i.e. information regarding usage and options are displayed.

This is the end of installing Dakota on Windows.



```
C:\Windows\system32\cmd.exe

C:\Users\caparici>\"C:\Program Files\Dakota\bin\dakota.exe\"
usage: C:\Program Files\Dakota\bin\dakota.exe [options and <args>]
  -help <Print this summary>
  -version <Print DAKOTA version number>
  -input <$val> <REQUIRED DAKOTA input file $val>
  -preproc [$val] <Pre-process input file with pyprepro or tool $val>
  -output <$val> <Redirect DAKOTA standard output to file $val>
  -error <$val> <Redirect DAKOTA standard error to file $val>
  -parser <$val> <Parsing technology: nidr[strict][:dumpfile]>
  -no_input_echo <Do not echo DAKOTA input file>
  -check <Perform input checks>
  -pre_run [$val] <Perform pre-run <variables generation> phase>
  -run [$val] <Perform run <model evaluation> phase>
  -post_run [$val] <Perform post-run <final results> phase>
  -read_restart [$val] <Read an existing DAKOTA restart file $val>
  -stop_restart <$val> <Stop restart file processing at evaluation $val>
  -write_restart [$val] <Write a new DAKOTA restart file $val>

Missing input file command line argument.

C:\Users\caparici>
```

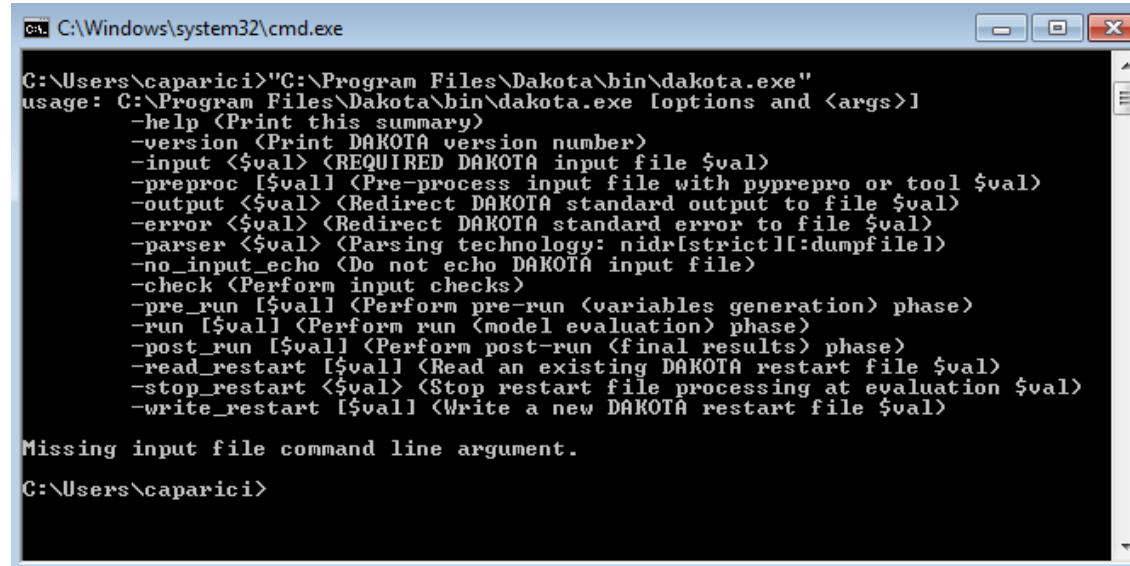


# Comments

The SOL 200 Web App expects Dakota to be accessible in one of the following ways:

- “C:\Program Files\Dakota\bin\dakota.exe”
  - Dakota was placed in the default location C:\Program Files\Dakota\bin\
- dakota
  - The location of the dakota.exe file was added to the PATH environment variable.
  - The location of dakota.exe may be any non-default location

> “C:\Program Files\Dakota\bin\dakota.exe”



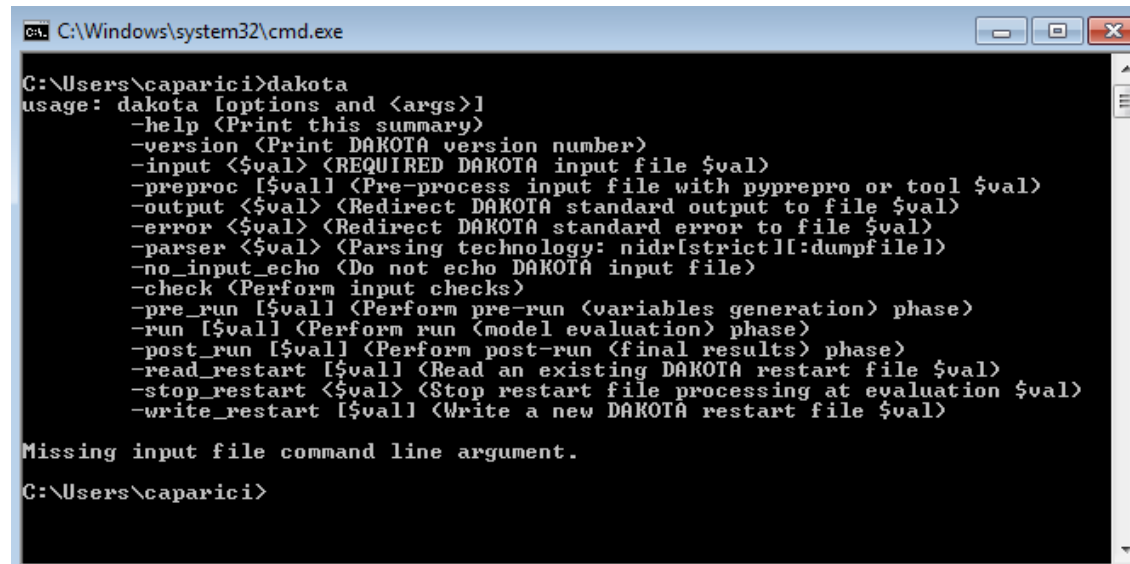
```
C:\Windows\system32\cmd.exe

C:\Users\caparici>"C:\Program Files\Dakota\bin\dakota.exe"
usage: C:\Program Files\Dakota\bin\dakota.exe [options and <args>]
  -help <Print this summary>
  -version <Print DAKOTA version number>
  -input <$val> <REQUIRED DAKOTA input file $val>
  -preproc [ $val] <Pre-process input file with pyprepro or tool $val>
  -output <$val> <Redirect DAKOTA standard output to file $val>
  -error <$val> <Redirect DAKOTA standard error to file $val>
  -parser <$val> <Parsing technology: nidr[strict][:dumpfile]>
  -no_input_echo <Do not echo DAKOTA input file>
  -check <Perform input checks>
  -pre_run [ $val] <Perform pre-run <variables generation> phase>
  -run [ $val] <Perform run <model evaluation> phase>
  -post_run [ $val] <Perform post-run <final results> phase>
  -read_restart [ $val] <Read an existing DAKOTA restart file $val>
  -stop_restart <$val> <Stop restart file processing at evaluation $val>
  -write_restart [ $val] <Write a new DAKOTA restart file $val>

Missing input file command line argument.

C:\Users\caparici>
```

> dakota



```
C:\Windows\system32\cmd.exe

C:\Users\caparici>dakota
usage: dakota [options and <args>]
  -help <Print this summary>
  -version <Print DAKOTA version number>
  -input <$val> <REQUIRED DAKOTA input file $val>
  -preproc [ $val] <Pre-process input file with pyprepro or tool $val>
  -output <$val> <Redirect DAKOTA standard output to file $val>
  -error <$val> <Redirect DAKOTA standard error to file $val>
  -parser <$val> <Parsing technology: nidr[strict][:dumpfile]>
  -no_input_echo <Do not echo DAKOTA input file>
  -check <Perform input checks>
  -pre_run [ $val] <Perform pre-run <variables generation> phase>
  -run [ $val] <Perform run <model evaluation> phase>
  -post_run [ $val] <Perform post-run <final results> phase>
  -read_restart [ $val] <Read an existing DAKOTA restart file $val>
  -stop_restart <$val> <Stop restart file processing at evaluation $val>
  -write_restart [ $val] <Write a new DAKOTA restart file $val>

Missing input file command line argument.

C:\Users\caparici>
```

# Comments

This exercise configured Dakota v6.19.0.

Other versions of Dakota may be installed.

1. Click the indicated link
2. Navigate to the version of interest
3. Click Assets
4. Download one of the files whose name contains the following strings
  - .zip
  - Windows
  - *cli* or *gui\_cli*

One ZIP file is needed. The string *cli* indicates the ZIP file contains the Dakota solver. The string *gui* indicates the ZIP file contains the GUI.

<https://github.com/snl-dakota/dakota/releases>

1

May 24, 2023

dakota-snl

v6.18.0

f6cb33b

Compare

6.18.0

2

Release 6.18.0

[Documentation](#) and [Release Notes](#)

File name key:

- `gui_cli` - contain both the Dakota GUI and command-line executable
- `cli` - Command-line executable only
- `gui` - GUI only
- `src` - Source package, .zip for Windows line endings and .tar.gz for POSIX

3

Assets

16

<a href="#">dakota-6.18.0-public-darwin.Darwin.x86_64-cli.tar.gz</a>	38.5 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-darwin.Darwin.x86_64-gui_cli.tar.gz</a>	608 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-Darwin.x86_64-gui.tar.gz</a>	570 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-Linux.x86_64-gui.tar.gz</a>	383 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-rhel7.Linux.x86_64-cli.tar.gz</a>	46.3 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-rhel7.Linux.x86_64-gui_cli.tar.gz</a>	430 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-rhel8.Linux.x86_64-cli.tar.gz</a>	57.5 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-rhel8.Linux.x86_64-gui_cli.tar.gz</a>	441 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-src-cli.tar.gz</a>	138 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-src-cli.zip</a>	153 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-src-gui.zip</a>	5.94 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-windows.Windows.x64-cli.zip</a>	137 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-windows.Windows.x64-gui_cli.zip</a>	554 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-Windows.x64-gui.zip</a>	416 MB	May 24, 2023

4

# Comments

1. Note that different options (cli or gui) are available for each version. For example, version 6.20.0 only provides the solver (cli) for Dakota on Windows. There is no GUI (gui) option for Windows.

See file:

dakota-6.20.0-public-windows.Windows.x64-cli.zip

May 13

 dakota-snl

 v6.20.0

 494027b

Compare ▾

## 6.20.0 Latest













### Release 6.20.0

[Documentation](#) and [Release Notes](#)

File name key:

- `gui_cli` - contain both the Dakota GUI and command-line executable
- `cli` - Command-line executable only
- `gui` - GUI only
- `src` - Source package, .zip for Windows line endings and .tar.gz for POSIX

#### ▼ Assets 14

 <a href="#">dakota-6.20-public-darwin.Darwin.arm64-cli.tar.gz</a>	35.2 MB	May 13
 <a href="#">dakota-6.20-public-darwin.Darwin.arm64-gui_cli.tar.gz</a>	643 MB	May 13
 <a href="#">dakota-6.20.0-public-Darwin.x86_64-gui.tar.gz</a>	604 MB	May 13
 <a href="#">dakota-6.20.0-public-Linux.x86_64-gui.tar.gz</a>	421 MB	May 13
 <a href="#">dakota-6.20.0-public-rhel8.Linux.x86_64-cli.tar.gz</a>	60.4 MB	May 13
 <a href="#">dakota-6.20.0-public-rhel8.Linux.x86_64-gui_cli.tar.gz</a>	481 MB	May 13
 <a href="#">dakota-6.20.0-public-src-cli.tar.gz</a>	140 MB	May 13
 <a href="#">dakota-6.20.0-public-src-cli.zip</a>	154 MB	May 13
 <a href="#">dakota-6.20.0-public-src-gui.zip</a>	6.5 MB	May 13
 <a href="#">dakota-6.20.0-public-windows.Windows.x64-cli.zip</a>	140 MB	May 13
 <a href="#">Source code (zip)</a>		Apr 29
 <a href="#">Source code (tar.gz)</a>		Apr 29

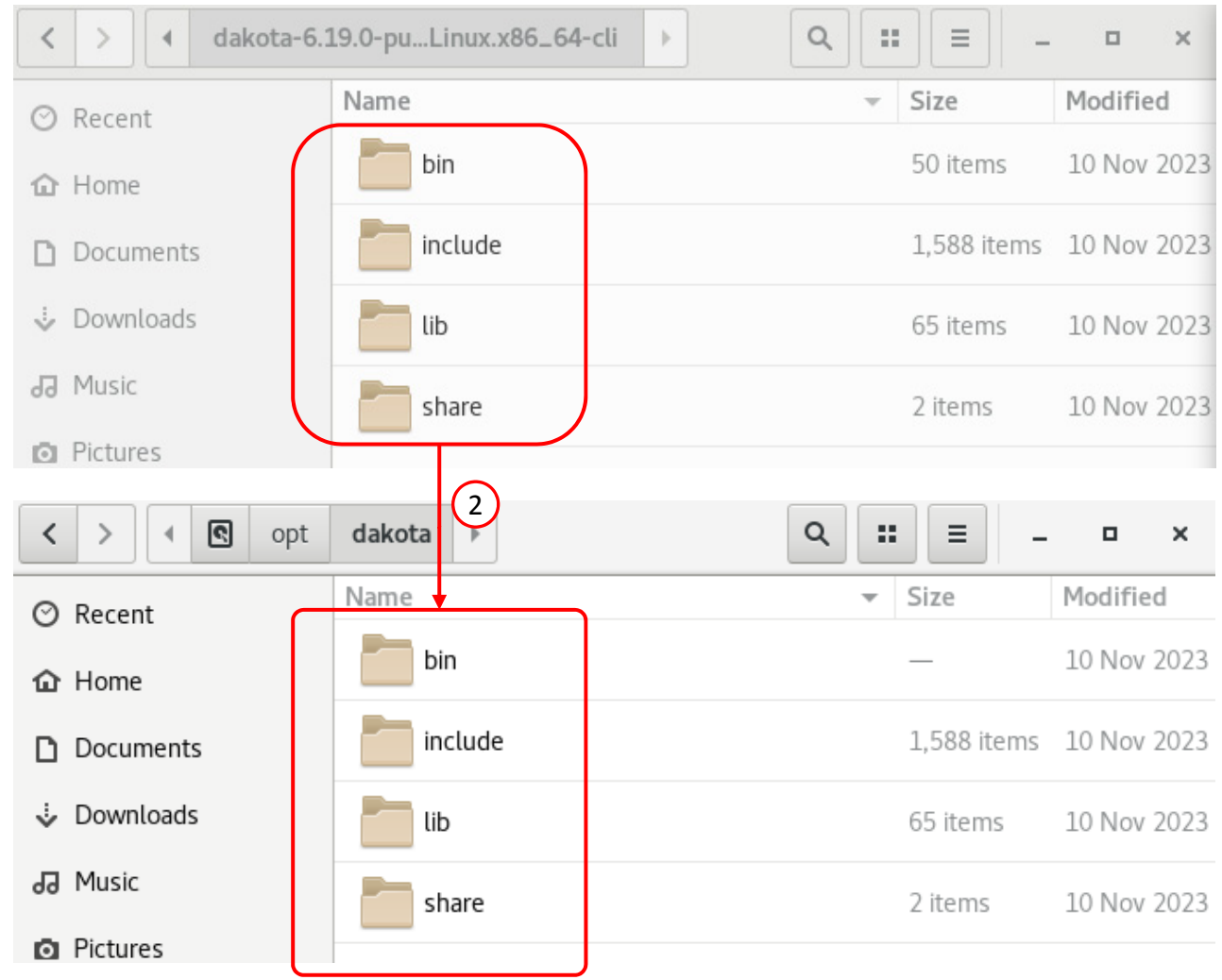
1

# Installing Sandia Dakota on Red Hat Linux 7

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# Download Dakota on Windows

1. Click the indicated link to download Dakota
2. Extract the contents of the ZIP file to: /opt/dakota. Use the indicated commands.



```
2 tar -xzf dakota-6.19.0-public-rhel7.Linux.x86_64-cli.tar.gz  
sudo mv dakota-6.19.0-public-rhel7.Linux.x86_64-cli /opt/dakota
```

# Test Dakota

1. Run this in the command prompt:

```
/opt/dakota/bin/dakota
```

2. Dakota is successfully configured if the output appears as shown, i.e. information regarding usage and options are displayed.

This is the end of installing Dakota on Red Hat Linux 7.

```
nectarine@vm-rhel-1:~/Downloads
File Edit View Search Terminal Help
[nectarine@vm-rhel-1 Downloads]$ /opt/dakota/bin/dakota ①
usage: dakota [options and <args>]
       -help (Print this summary)
       ② -version (Print DAKOTA version number)
       -input <$val> (REQUIRED DAKOTA input file $val)
       -preproc [$val] (Pre-process input file with pyprepro or tool $val)
       -output <$val> (Redirect DAKOTA standard output to file $val)
       -error <$val> (Redirect DAKOTA standard error to file $val)
       -parser <$val> (Parsing technology: nidr[strict][:dumpfile])
       -no_input_echo (Do not echo DAKOTA input file)
       -check (Perform input checks)
       -pre_run [$val] (Perform pre-run (variables generation) phase)
       -run [$val] (Perform run (model evaluation) phase)
       -post_run [$val] (Perform post-run (final results) phase)
       -read_restart [$val] (Read an existing DAKOTA restart file $val)
       -stop_restart <$val> (Stop restart file processing at evaluation $val)
       -write_restart [$val] (Write a new DAKOTA restart file $val)

Missing input file command line argument.
```

# Comments

The SOL 200 Web App expects Dakota to be accessible in one of the following ways:

- /opt/dakota/bin/dakota
  - Dakota was placed in the default location /opt/dakota
- dakota
  - The location of the dakota executable file was added to the PATH environment variable.
  - The location of dakota may be any non-default location

## \$ /opt/dakota/bin/dakota

```
nectarine@vm-rhel-1:~/Downloads
File Edit View Search Terminal Help
[nectarine@vm-rhel-1 Downloads]$ /opt/dakota/bin/dakota
usage: dakota [options and <args>]
  -help (Print this summary)
  -version (Print DAKOTA version number)
  -input <$val> (REQUIRED DAKOTA input file $val)
  -preproc [$val] (Pre-process input file with pyprepro or tool $val)
  -output <$val> (Redirect DAKOTA standard output to file $val)
  -error <$val> (Redirect DAKOTA standard error to file $val)
  -parser <$val> (Parsing technology: nidr[strict][:dumpfile])
  -no_input_echo (Do not echo DAKOTA input file)
  -check (Perform input checks)
  -pre_run [$val] (Perform pre-run (variables generation) phase)
  -run [$val] (Perform run (model evaluation) phase)
  -post_run [$val] (Perform post-run (final results) phase)
  -read_restart [$val] (Read an existing DAKOTA restart file $val)
  -stop_restart <$val> (Stop restart file processing at evaluation $val)
  -write_restart [$val] (Write a new DAKOTA restart file $val)

Missing input file command line argument.
```

## \$ dakota

```
nectarine@vm-rhel-1:~/Downloads
File Edit View Search Terminal Help
[nectarine@vm-rhel-1 Downloads]$ dakota
usage: dakota [options and <args>]
  -help (Print this summary)
  -version (Print DAKOTA version number)
  -input <$val> (REQUIRED DAKOTA input file $val)
  -preproc [$val] (Pre-process input file with pyprepro or tool $val)
  -output <$val> (Redirect DAKOTA standard output to file $val)
  -error <$val> (Redirect DAKOTA standard error to file $val)
  -parser <$val> (Parsing technology: nidr[strict][:dumpfile])
  -no_input_echo (Do not echo DAKOTA input file)
  -check (Perform input checks)
  -pre_run [$val] (Perform pre-run (variables generation) phase)
  -run [$val] (Perform run (model evaluation) phase)
  -post_run [$val] (Perform post-run (final results) phase)
  -read_restart [$val] (Read an existing DAKOTA restart file $val)
  -stop_restart <$val> (Stop restart file processing at evaluation $val)
  -write_restart [$val] (Write a new DAKOTA restart file $val)

Missing input file command line argument.
```

# Comments

The PATH environment variable may be modified as follows.

1. Run  
`sudo gedit ~/.bashrc`
2. Append `:/opt/dakota/bin` to the PATH variable as shown.

## Example 1

Before: `export PATH=$PATH`

After: `export PATH=$PATH:/opt/dakota/bin`

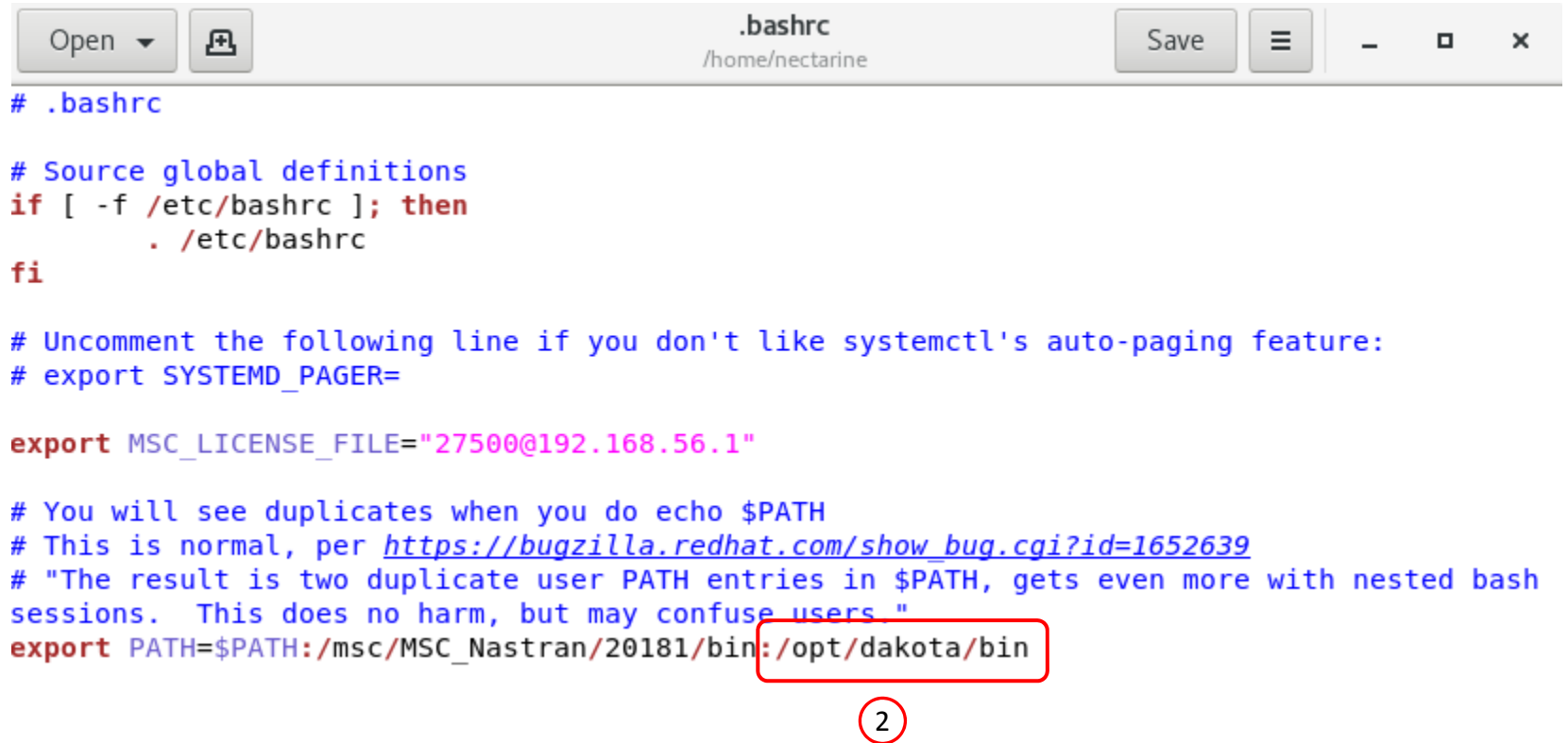
## Example 2

Before: `export PATH=$PATH:/msc/MS_Nastran/20181/bin`

After: `export PATH=$PATH:/msc/MS_Nastran/20181/bin:/opt/dakota/bin`

3. Save the file
4. Close and reopen the terminal
5. Dakota may now be accessed with the shorthand form:

`dakota`



```
# .bashrc

# Source global definitions
if [ -f /etc/bashrc ]; then
    . /etc/bashrc
fi

# Uncomment the following line if you don't like systemctl's auto-paging feature:
# export SYSTEMD_PAGER=

export MSC_LICENSE_FILE="27500@192.168.56.1"

# You will see duplicates when you do echo $PATH
# This is normal, per https://bugzilla.redhat.com/show\_bug.cgi?id=1652639
# "The result is two duplicate user PATH entries in $PATH, gets even more with nested bash
sessions. This does no harm, but may confuse users."
export PATH=$PATH:/msc/MS_Nastran/20181/bin:/opt/dakota/bin
```



# Comments

This exercise configured Dakota v6.19.0.

Other versions of Dakota for Red Hat Linux 7 or 8 may be installed.

1. Click the indicated link
2. Navigate to the version of interest
3. Click Assets
4. Download one of the files whose name contains the following strings
  - `.tar.gz`
  - `rhel7` or `rhel8`
  - `cli` or `gui_cli`

One `tar.gz` file is needed. The string `cli` indicates the ZIP file contains the Dakota solver. The string `gui` indicates the ZIP file contains the GUI. The string `rhel7` indicates compatibility with Red Hat Linux 7. The string `rhel8` indicates compatibility with Red Hat Linux 8.

<https://github.com/snl-dakota/dakota/releases>

1

May 24, 2023

dakota-snl

v6.18.0

f6cb33b

Compare

## 6.18.0

### Release 6.18.0

[Documentation](#) and [Release Notes](#)

File name key:

- `gui_cli` - contain both the Dakota GUI and command-line executable
- `cli` - Command-line executable only
- `gui` - GUI only
- `src` - Source package, `.zip` for Windows line endings and `.tar.gz` for POSIX

3

▼ Assets 16

<a href="#">dakota-6.18.0-public-darwin.Darwin.x86_64-cli.tar.gz</a>	38.5 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-darwin.Darwin.x86_64-gui_cli.tar.gz</a>	608 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-Darwin.x86_64-gui.tar.gz</a>	570 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-Linux.x86_64-gui.tar.gz</a>	383 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-rhel7.Linux.x86_64-cli.tar.gz</a>	46.3 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-rhel7.Linux.x86_64-gui_cli.tar.gz</a>	430 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-rhel8.Linux.x86_64-cli.tar.gz</a>	57.5 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-rhel8.Linux.x86_64-gui_cli.tar.gz</a>	441 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-src-cli.tar.gz</a>	138 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-src-cli.zip</a>	153 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-src-gui.zip</a>	5.94 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-windows.Windows.x64-cli.zip</a>	137 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-windows.Windows.x64-gui_cli.zip</a>	554 MB	May 24, 2023
<a href="#">dakota-6.18.0-public-Windows.x64-gui.zip</a>	416 MB	May 24, 2023

4

# Comments

1. Note that different options (CLI or GUI, RHEL 7 or 8) are available for each version. For example, version 6.20.0 only provides Dakota for Red Hat Linux 8, not 7. See file:

dakota-6.20.0-public-rhel8.Linux.x86\_64-cli.tar.gz

dakota-6.20.0-public-rhel8.Linux.x86\_64-gui\_cli.tar.gz

If your operating system is not listed, you may compile your own version of Dakota using the source files that are available, e.g. dakota-6.20.0-public-src-cli.tar.gz .

Contact The Engineering Lab for assistance.

May 13

 dakota-snl

v6.20.0

494027b

Compare

## 6.20.0 Latest













### Release 6.20.0

[Documentation](#) and [Release Notes](#)

File name key:

- `gui_cli` - contain both the Dakota GUI and command-line executable
- `cli` - Command-line executable only
- `gui` - GUI only
- `src` - Source package, .zip for Windows line endings and .tar.gz for POSIX

#### Assets 14

 <a href="#">dakota-6.20-public-darwin.Darwin.arm64-cli.tar.gz</a>	35.2 MB	May 13
 <a href="#">dakota-6.20-public-darwin.Darwin.arm64-gui_cli.tar.gz</a>	643 MB	May 13
 <a href="#">dakota-6.20.0-public-Darwin.x86_64-gui.tar.gz</a>	604 MB	May 13
 <a href="#">dakota-6.20.0-public-Linux.x86_64-gui.tar.gz</a>	421 MB	May 13
 <a href="#">dakota-6.20.0-public-rhel8.Linux.x86_64-cli.tar.gz</a>	60.4 MB	May 13
 <a href="#">dakota-6.20.0-public-rhel8.Linux.x86_64-gui_cli.tar.gz</a>	481 MB	May 13
 <a href="#">dakota-6.20.0-public-src-cli.tar.gz</a>	140 MB	May 13
 <a href="#">dakota-6.20.0-public-src-cli.zip</a>	154 MB	May 13
 <a href="#">dakota-6.20.0-public-src-gui.zip</a>	6.5 MB	May 13
 <a href="#">dakota-6.20.0-public-windows.Windows.x64-cli.zip</a>	140 MB	May 13
 <a href="#">Source code (zip)</a>		Apr 29
 <a href="#">Source code (tar.gz)</a>		Apr 29

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End of Tutorial