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Chapter 1. Introduction

NVIDIA® Base Command™ Platform is a comprehensive platform for businesses, their data scientists and IT teams that accelerates ROI for AI initiatives. It manages the end-to-end lifecycle of AI development including workload management and resource sharing with both a graphical user interface and command line APIs with integrated monitoring and reporting dashboards. Offered in a cloud-hosted solution that continuously delivers NVIDIA innovations directly into your AI workflow, Base Command Platform works across on-prem and cloud resources with a single pane of glass view into your AI development process.

Following are a description of the primary concepts of NVIDIA Base Command.

**Container Images**

All applications running in NGC are containerized as Docker containers and execute in our Runtime environment. Containers are stored in the NGC Container Registry nvcr.io, accessible from both the CLI and the Web UI.

**Datasets**

Datasets are the data inputs to a job, mounted as read-only to the location specified in the job. Datasets can contain data or code. Datasets are covered in detail in the Datasets section.

**Workspaces**

Workspaces are shareable read-write persistent storage mountable in jobs for concurrent use. Workspaces can be mounted to a job in read-only mode too, making those ideal for configuration/code/input use cases in the comfort of knowing that the job will not corrupt/modify any of this data. Mounting workspaces in read-write mode (which is the default) in a job works well for use as a checkpoint fol

**Jobs**

A Job is the fundamental unit of computation - a container running an NVIDIA Base Command Platform instance in an accelerated computing environment (ACE). Job is defined by the set of attributes specified at submission. Details about the architecture of Base Command can be found in Chapters 8 and 10 of the NVIDIA Base Command User Guide.
Chapter 2. Inviting Users

This section is for org or team administrators (with User Admin role) and describes the process for inviting (adding) users to NVIDIA Base Command.

As the organization administrator, you must create user accounts to allow others to use the NVIDIA Base Command within the organization.

1. Log on to the NGC web UI and select the NGC Org associated with NVIDIA Base Command.
2. Click **Organization > Users** from the left side menu.

   ![Organization menu](image)

   This capability is available only to User Admins.

3. Click the “+” icon at the lower right corner, then select the **Invite New User** icon.

   ![Invite New User](image)

4. Select the **Personal Info** tab and then enter the display name and email where indicated.
5. Click **Next** or select the **Membership** tab and then select one or more user roles.

The following are brief descriptions of the user roles:

**Table 1.**

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Command Admin</td>
<td>Admin persona with the capabilities to manage all artifacts available in Base Command. The capabilities of the Admin role include resource allocation and access management.</td>
</tr>
</tbody>
</table>
### Base Command Viewer
Admin persona with the read-only access to jobs, workspaces, datasets, and results within the user’s org or team.

### Registry Admin
Registry Admin persona for managing NGC Private Registry artifacts and with the capability for Registry User Management. The capabilities of the Registry Admin role include the capabilities of all Registry roles.

### Registry Only
Registry User persona with capabilities to only consume the Private Registry artifacts.

### Registry User
Registry User persona with the capabilities to publish and consume the Private Registry artifacts.

### User Admin
User Admin persona with the capabilities to only manage users.

See also the section [Assigning Roles](#) in the NVIDIA Base Command Manager User Guided for additional information.

6. (Optional) Select a team for the user and select one or more roles for the user to have within that team.

7. Click **Assign**.

If you want to assign the user to more than one team, select another team and role, then click **Assign**. The following example screenshot shows a user assigned to two teams:
8. Click **Confirm** to complete the process.

   An invitation email is automatically sent to the user.
Before using NVIDIA Base Command, you must have an NVIDIA Base Command account created by your organization administrator. You need an email address to set up an account. The process for activating an account depends on whether your email domain is mapped to your organization’s single sign-on (SSO). Choose one of the following processes depending on your situation for activating your NVIDIA Base Command account.

- **Joining an NGC Org or Team Using Single Sign-on**
- **Joining an Org or Team with a New NVIDIA Account**
- **Joining an Org or Team with an Existing NVIDIA Account**

### 3.1. Joining an NGC Org or Team Using Single Sign-on

This section describes activating an account where the domain of your email address is mapped to an organization’s single sign-on.

After NVIDIA or your organization administrator adds you to a new org or team within the organization, you will receive a welcome email that invites you to continue the activation and login process.
Joining an NGC Org or Team

1. Click the link in the email to open your organization’s single sign-on page.
2. Sign in using your single sign-on credentials.
   
   The Set Your Organization screen appears.

   This screen appears any time you log in.
3. Select which organization and team you want to log in under and then click Sign In.
   
   You can always change the org or team to any other org or team of which you are a member after you log in.
   
   The NGC web UI opens to the Base Command dashboard.
3.2. Joining an Org or Team with a New NVIDIA Account

This section describes activating a new account where the domain of your email address is not mapped to an organization’s single sign-on.

After NVIDIA or your organization administrator sets up your NVIDIA Base Command account, you will receive a welcome email that invites you to continue the activation and login process.

1. Click the Sign In link to open the sign in dialog in your browser.
2. Click **Create account** to open the Create an Account screen.
3. Fill out your information, create a password, agree to the Terms and Conditions and then click **Create Account**.

You are notified to verify your email.

The verification email is sent.
4. Open the email and then click **Verify Email Address**.
5. Select your options for using recommended settings and receiving developer news and announcements, and then click **Submit**.

6. Agree to the NVIDIA Account Terms of Use and select desired options and then click **Continue**.

7. Click **Accept** at the **NVIDIA GPU Cloud Terms of Use** screen.
8. Click **Accept** at the **NVIDIA GPU Cloud Terms of Use** screen. The Set Your Organization screen appears.
This screen appears any time you log in.

9. Select which organization and team you want to log in under and then click **Sign In**.

You can always change the org or team to any other org or team of which you are a member after you log in.

The NGC web UI opens to the **Base Command** dashboard.

---

### 3.3. Joining an Org or Team with an Existing NVIDIA Account

This section describes activating an account where the domain of your email address is not mapped to an organization’s single sign-on (SSO).

After NVIDIA or your organization administrator adds you to a new org or team within the organization, you will receive a welcome email that invites you to continue the activation and login process.

---

1. Click the Sign In link to open the sign in dialog in your browser.
2. Enter your password and then click **Log In**.
   The Set Your Organization screen appears.
This screen appears any time you log in.

3. Select which organization and team you want to log in under and then click **Sign In**. You can always change the org or team to any other org or team of which you are a member after you log in.

The NGC web UI opens to the **Base Command** dashboard.
Chapter 4. Signing in to Your Account

During the initial account setup, you are signed into your NVIDIA Base Command account on the NGC web site. This section describes the sign in process that occurs at a later time. It also describes the web UI sections of NVIDIA Base Command at a high level, including the UI areas for accessing available artifacts and actions available to various user roles.

1. Open https://ngc.nvidia.com and click Continue by one of the sign-on choices, depending on your account.
   - NVIDIA Account: Select this option if single sign-on (SSO) is not available.
   - Single Sign-on (SSO): Select this option to use your organization’s SSO. You may need to verify with your organization or Base Command administrator whether SSO is enabled.

2. Continue to sign in using your organization’s single sign-on.
3. Set the organization you wish to sign in under, then click Sign in.

You can always change the org or team to any other org or team of which you are a member. The following image and table describe the main drop-down features of the web site, including the controls for changing the org or team.
Table 2. NGC Web UI Sections

<table>
<thead>
<tr>
<th>ID</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>CATALOG</strong>: Click this menu option to access a curated set of GPU-optimized software. It consists of containers, pre-trained models, Helm charts for Kubernetes deployments, and industry-specific AI toolkits with software development kits (SDKs) that are periodically released by NVIDIA and are read-only for a Base Command user.</td>
</tr>
<tr>
<td>2</td>
<td><strong>PRIVATE REGISTRY</strong>: Click this drop-down to access the secure space to store and share custom containers, models, resources, and helm charts within your enterprise.</td>
</tr>
<tr>
<td>3</td>
<td><strong>BASE COMMAND</strong>: Click this drop-down to access controls for creating and running Base Command jobs.</td>
</tr>
<tr>
<td>4</td>
<td><strong>ORGANIZATION</strong>: (User Admins only) Click this drop-down to manage users and teams.</td>
</tr>
<tr>
<td>5</td>
<td><strong>User Info</strong>: Select this drop-down list to view user information, select the org to operate under, and download the NGC CLI and API key, described later in this document.</td>
</tr>
<tr>
<td>6</td>
<td><strong>Team Selection</strong>: Select this drop-down list to select which team to operate under.</td>
</tr>
</tbody>
</table>
Chapter 5. Introduction to the NGC CLI

This chapter introduces the NGC Base Command CLI, installable on your workstation for interfacing with Base Command. In this section you will learn about generic features of CLI applicable to all commands as well as CLI modules that map to the Web UI areas that you have learned about in a previous chapter.

The NGC Base Command CLI is a command-line interface for managing content within the NGC Registry and for interfacing with the NVIDIA Base Command. The CLI operates within a shell and lets you use scripts to automate commands.

With NGC Base Command CLI, you can connect with:

- NGC Catalog
- NGC Private Registry
- User Management (available to org or team User Admins only)
- NVIDIA Base Command workloads and entities

5.1. Installing NGC CLI

To install NGC CLI, perform the following:

1. Log in to your NVIDIA Base Command account on the NGC website [https://ngc.nvidia.com].
2. In the top right corner, click your user account icon and select an org that belongs to the Base Command account.
3. From the user account menu, select Setup, then click Downloads under Install NGC CLI from the Setup page.
4. From the CLI Install page, click the Windows, Linux, or MacOS tab, according to the platform from which you will be running NGC CLI.
5. Follow the Install instructions that appear on the OS section that you selected.
6. Verify the installation by entering `ngc --version`. The output should be “NGC CLI x.y.z” where x.y.z indicates the version.

5.2. Generating Your NGC API Key
This section describes how to obtain an API key needed to configure the CLI application so you can use the CLI to access locked container images from the NGC Catalog, access content from the NGC Private Registry, manage storage entities, and launch jobs.

The NGC API key is also used for docker login to manage container images in the NGC Private Registry with the docker client.

1. Sign in to the NGC web UI.
   a). From a browser, go to https://ngc.nvidia.com/signin/email and then enter your email
   b). Click Continue by the Sign in with Enterprise sign in option.
   c). Enter the credentials for your organization.

2. In the top right corner, click your user account icon and then select an org that belongs to the NVIDIA Base Command account.

3. Click your user account icon again and select Setup.

4. Click Get API key to open the Setup > API Key page.

5. Click Generate API Key to generate your API key. A warning message appears to let you know that your old API key will become invalid if you create a new key.

6. Click Confirm to generate the key.
Your API key appears.

You only need to generate an API Key once. NGC does not save your key, so store it in a secure place. (You can copy your API Key to the clipboard by clicking the copy icon to the right of the API key.)

Should you lose your API Key, you can generate a new one from the NGC website. When you generate a new API Key, the old one is invalidated.

5.3. Getting Help Using NGC CLI

This section describes how to get help using NGC CLI.

5.3.1. Getting Help from the Command Line

To run an NGC CLI command, enter "ngc" followed by the appropriate options.

To see a description of available options and command descriptions, use the option -h after any command or option.

Example 1: To view a list of all the available options for the ngc command, enter

$ ngc -h

Example 2: To view a description of all ngc batch commands and options, enter

$ ngc batch -h

Example 3: To view a description of the dataset commands, enter

$ ngc dataset -h

5.3.2. Viewing NGC CLI Documentation Online

The NGC Base Command CLI documentation provides a reference for all the NGC Base Command CLI commands and arguments. You can also access the CLI documentation from the NGC web UI by selecting Setup from the user drop down list and then clicking Documentation from the Install NGC CLI box.

5.4. Configuring the CLI for your Use

To make full use of NGC Base Command CLI, you must configure it with your API key using the ngc config set command.

While there are options you can use for each command to specify org and team, as well as the output type and debug mode, you can also use the ngc config set command to establish these settings up front.

If you have a pre-existing set up, you can check the current configuration using:

$ ngc config current

To configure the CLI for your use, issue the following:
5.5. Running the Diagnostics

Diagnostic information is available which provides details to assist in isolating issues. Provide this information when reporting issues with the CLI to NVIDIA support.

The following diagnostic information is available for the NGC Base Command CLI user:

- Current time
- Operating system
- Disk usage
- Current directory size
- Memory usage
- NGC CLI installation
- NGC CLI environment variables (whether set and or not set)
- NGC CLI configuration values
- API gateway connectivity
- API connectivity to the container registry and model registry
- Data storage connectivity
- Docker runtime information
- External IP
- User information (ID, name, and email)
- User org roles
- User team roles

**Syntax**

\$ ngc diag [all, client, install, server, user]

where

- **all**
  Produces the maximum amount of diagnostic output.

- **client**
  Produces diagnostic output only for the client machine.
**install**
Produces diagnostic output only for the local installation.

**server**
Produces diagnostic output only for the remote server.

**user**
Produces diagnostic output only for the user configuration.
Chapter 6. Quickly Launching a Job

This section contains example workflows demonstrating commonly used functionalities along with useful notes. If you have already completed the sections so far (i.e. onboarded and configured CLI), you will be able to try any of the included commands using your own account.

6.1. Launching a Job from Existing Templates

1. Click BASE COMMAND > Jobs the left-side menu and then click Create Job.
2. Click Templates from the ribbon menu.
3. Click the menu icon for the template to use, then select Apply Template.
The create a job page opens with the fields populated with the information from the job template.

4. Verify the pre-filled fields, enter a unique name, then click Launch.

6.2. Cloning an Existing Job

You can clone jobs, which is useful when you want to start with an existing job and make small changes for a new job.

1. Click Dashboard from the left-side menu, click the table view icon next to the search bar, then click the menu icon for the job you want to copy and select Clone Job from the menu.
The create a job page opens with the fields populated with the information from the cloned job.

2. Edit fields as needed to create a new job, enter a unique name in the **Name** field, then click **Launch**.

The job should appear in the job dashboard.
Chapter 7. Managing Jobs

This section describes various job management tasks.

7.1. Checking Job Name, ID, Status, and Results

Using the NGC Web UI

Log into the NGC website, then click JOBS from the left-side menu.

The Jobs page lists all the jobs that you have run and shows the status, job name and ID.

The Status column reports the following progress along with timestamps: Created -> Queued -> Starting -> Running -> Finish.

When a job is in the Queued state, the Status History tab in the Web UI shows the reason for the queued state. The job info command on CLI also displays this detail.

When finished, click on your job entry from the JOBS page. The Results and Log tab both show the output produced by your job.

Using the CLI

After launching a job using the CLI, the output confirms a successful launch and shows the job details.

Example:

<table>
<thead>
<tr>
<th>Job Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Id: 1854152</td>
</tr>
<tr>
<td>Name: ngc-batch-simple-job-raid-dataset-mnt</td>
</tr>
<tr>
<td>Number of Replicas: 1</td>
</tr>
<tr>
<td>Job Type: BATCH</td>
</tr>
<tr>
<td>Submitted By: John Smith</td>
</tr>
<tr>
<td>Job Container Information</td>
</tr>
<tr>
<td>Docker Image URL: nvidia/pytorch:21.02-py3</td>
</tr>
<tr>
<td>...</td>
</tr>
<tr>
<td>Job Status</td>
</tr>
<tr>
<td>Created at: 2021-03-19 18:13:12 UTC</td>
</tr>
<tr>
<td>Status: CREATED</td>
</tr>
<tr>
<td>Preempt Class: RUNONCE</td>
</tr>
</tbody>
</table>
The Job Status of CREATED indicates a job that was just launched.

You can monitor the status of the job by issuing:

```
$ ngc batch info <job-id>
```

This returns the same job information that is displayed after launching the job, with updated status information.

To view the stdout/stderr of a running job, issue the following:

```
$ ngc batch attach <job_id>
```

All the NGC Base Command CLI commands have additional options; issue `ngc --help` for details.

### 7.2. Monitoring Console Logs (joblog.log)

Job output (both STDOUT and STDERR) is captured in the `joblog.log` file.

#### Using the NGC Web UI

To view the `joblog.log` file, select the job from the Jobs page, then select the Log tab.

#### Using the CLI

Issue the following.

```
$ ngc result download <job-id>
```

The `joblog.log` file is included with the results which are downloaded to the current directory on your local disk in a folder labelled `job-id`.

To view the STDOUT/STDERR of a running job, issue the following:

```
$ ngc batch attach <job_id>
```

### 7.3. Downloading Results (interim and after completion)

#### Using the NGC Web UI

To download job results, do the following:

1. Select the job from the Jobs page, then select the Results tab.
2. From the Results page, select the file to download.
The file is downloaded to your Download folder.

**Using the CLI**

Issue the following:

$ ngc results download <job-id>

The results are downloaded to the current directory on your local disk in a folder labelled `<job-id>`.

### 7.4. Terminating Jobs

**Using the NGC Web UI**

To terminate a job from the NGC website, waiting until the job appears in the Jobs page, then click the menu icon for the job and select **Kill Job**.

**Using the CLI**

Note the job ID after launching the job, then issue the following:

$ ngc batch kill <job-id>

**Example**:

$ ngc batch kill 1854178

Submitted job kill request for Job ID: '1854178'

You can also kill several jobs with one command by listing multiple job IDs as a combination of comma-separated IDs and ranges; for example ‘1-5’, ‘333’, ‘1, 2’, ‘1,10-15’.
7.5. Deleting Results

Results remain in the system consuming quota until removed:

$ ngc result remove <job_id>
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