bionano™

Bionano Compute On Demand v1.4.1.1 Release Notes

DOCUMENT NUMBER:
RNOTE-00013

DOCUMENT REVISION:
A

Effective Date:
01/24/2024

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Revision History

REVISION	NOTES
A	Initial release of document.

Bionano Compute On Demand

This document describes the v1.4.1 release of Bionano Compute On Demand. In this document an overview of the service and how to access it along with new features in v1.4.1 is provided. Should users have any questions please contact support@bionano.com.

Introduction

Bionano Compute On Demand is a hosted service for performing Bionano Solve operations. It is accessible through the Bionano Access web server. Once enabled (the process is described below), users can employ cloud resources to execute various analyses of Bionano data using the Bionano Solve pipelines. Bionano Compute On Demand is a pay-per-use service. Customers use tokens to pay for their jobs. Each job is executed on its own independent compute environment, and the results are returned to the user's Bionano Access system. Once the results have been successfully downloaded to Bionano Access, they are deleted from the Bionano Compute On Demand system.

Audience

Bionano Compute On Demand is a useful product for all users of Bionano Access. The following are scenarios that would benefit from this offering:

- Users have Bionano data but no Compute resources.
- It is not possible for the user's organization to host Compute servers.
- An operation needs to be expedited but the Compute cluster is busy.
- Capacity beyond the existing Compute servers for a brief period is required.
- Compute resources are not needed all the time.
- Users process plant or animal genomes larger than 5 Gbp.

Compatibility

Bionano Compute On Demand v1.4.1 is compatible with Bionano Access 1.5 or greater. The version of Bionano Solve used for Compute on Bionano's Compute On Demand service will depend on which version of Bionano Access is used. For example, Bionano Access 1.8.1 is designed to work with Bionano Solve 3.8.1. This way, the Bionano Compute On Demand results are consistent with any Compute jobs users might perform locally. It also allows users to control when they upgrade to the latest pipeline.

Internet Access

To interface with the Bionano Compute On Demand service, the user's Bionano Access server must have internet access. Bionano recommends that 20 Mbps upload and download speed is available to accommodate large file uploads and downloads. Slower speeds will work if the connection is stable, but file transfers could take considerable time depending on the speed of the connection. A typical human *de novo* assembly result file could be 5-10 GB.

Capacity and Performance

There are limitations on the size of input data for operations the Bionano Compute On Demand service will allow. For this release, *de novo* assembly operations accept BNX files with less than 4 Tbp of DNA longer than 150 kbp. Rare variant analysis operations accept BNX files with less than 6 Tbp of DNA longer than 150 kbp. When submitting a job with more data than these limits, Bionano Access will show a warning and not allow that data to be processed. The data can be down sampled using Bionano Access. Please review the various Bionano Theory of Operations documents for the coverage recommended for the different operations.

How to Enable the Service

To enable Compute On Demand the user must be an Administrator. This role should appear in the breadcrumbs bar in the header. From the **Home** page, click the **Settings** button, shown in **Figure 1**.
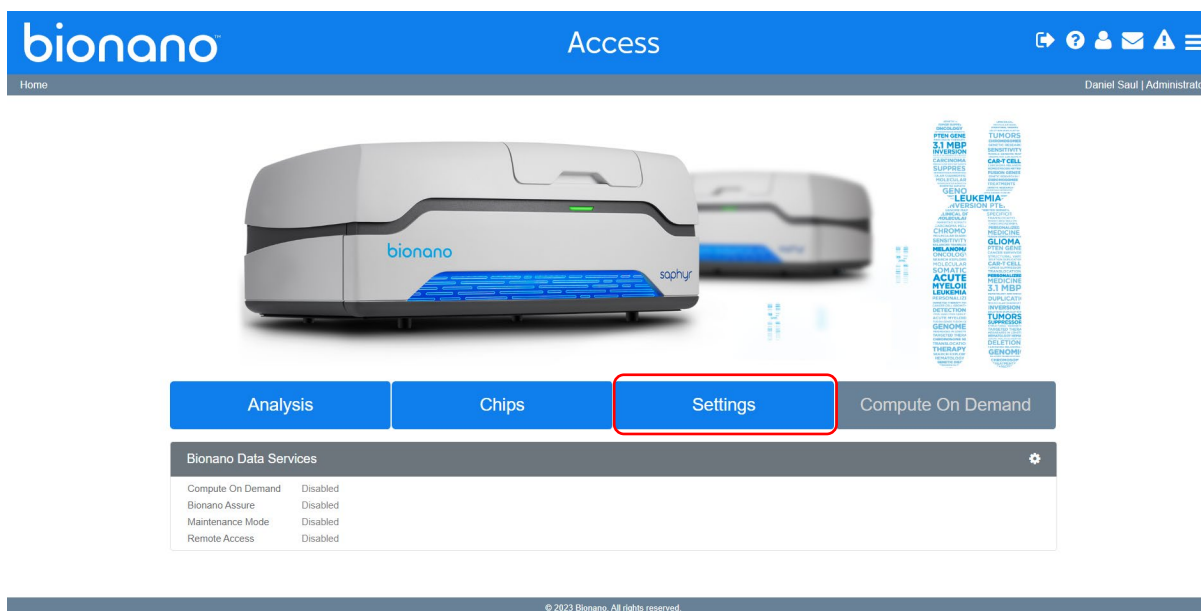
Figure 1. Compute On Demand Settings button.

From the settings screen, click the **System Services Settings** button, as shown in **Figure 2**.
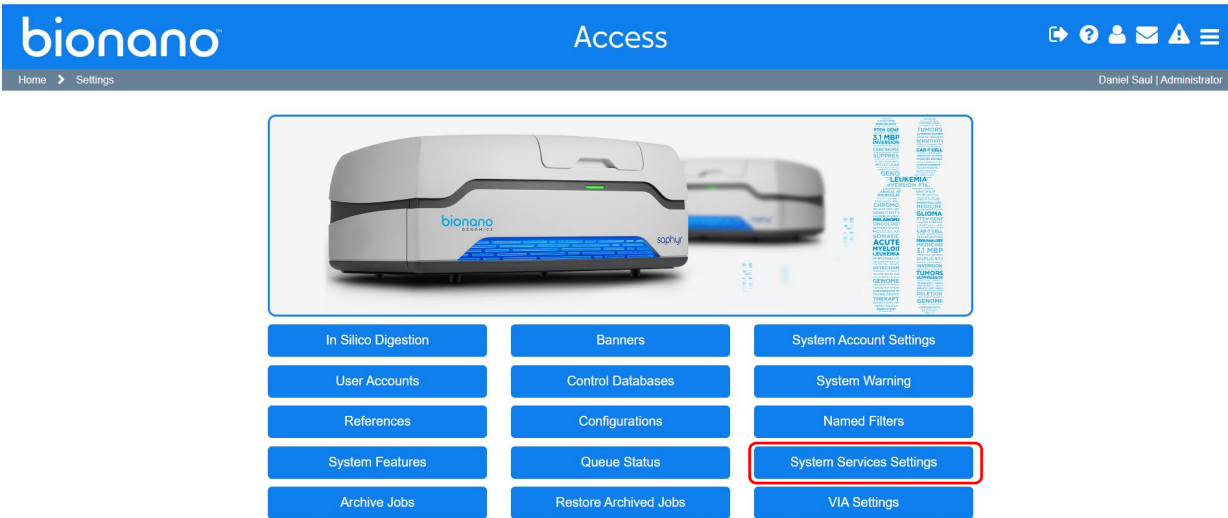
Figure 2. Compute On Demand System Services Settings button.

As seen in **Figure 3** and **Figure 4**, click the slider in the **Compute On Demand and Saphyr Assure** panel on the system settings page.
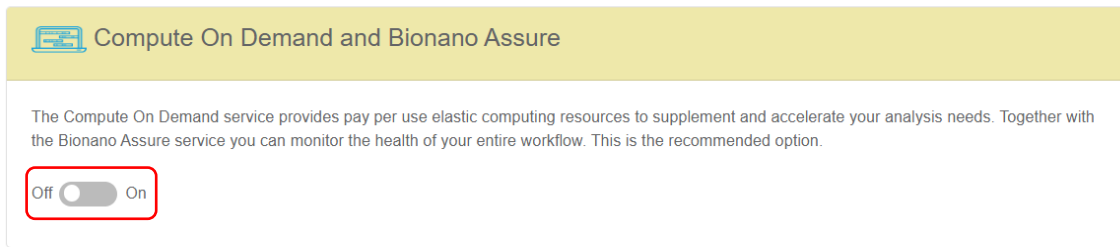

Figure 3. Slider in the **Compute On Demand and Bionano Assure** panel.

Figure 4. System Service Settings menu.

For first time enablement of the service, users will be prompted for some information and asked to agree to the Compute On Demand Terms and Conditions, shown in **Figure 5**. Provide the information requested then click **I Accept**. Users can view the Terms and Conditions anytime by clicking the **Terms and Conditions** link.

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Figure 5. Terms and Conditions Accept button.

If the user is not ready to complete the opt-in dialog, click the **Cancel** button. Administrators will continue to be prompted each time they login until they complete the **opt-in** dialog or until the **BCOD** setting in the configuration file is removed. Once the opt-in has been completed, the dialog will no longer appear. Users will not be able to change selections later, so complete the form carefully.

The first prompt is for the **Organization/Company Name**. Bionano recommends setting this value to the domain in the user email. For the example, jsmith@bionanogenomics.com, it is recommended to set the organization to 'bionanogenomics.' Do not use a generic name like 'Instrument' or 'Saphyr' for the user organization. The organization name is used to identify jobs launched from the user's instance of Bionano Access. Each Bionano Access server must have a unique organization name and if this criteria is not met the name will not be accepted.

The second prompt is for the computing region. Regional computing end points are offered. These include North America, Canada (specifically for customers based in Canada), Europe, and Germany (specifically for customers based in Germany). Additional regions may be added in the future. The region is where the servers that will execute Compute jobs will reside. There is no restriction to which region users choose but selecting a region closest to where the system resides is best for security and performance reasons. For example, it is recommended to not select Canada or Germany unless there are restrictions to have data reside only in those regions.

Compute on Demand Operations

Once the opt-in process described above has been completed, **Bionano Compute On Demand** options will appear in the **Project** browser, shown in **Figure 6**. In the **Project** browser, the **Options** panel will display different operations that can be performed based on the object type selected. When **Bionano Compute On Demand** is enabled, there will be a toggle to run the job locally or with Compute On Demand. The default will be local if local compute resources are available.
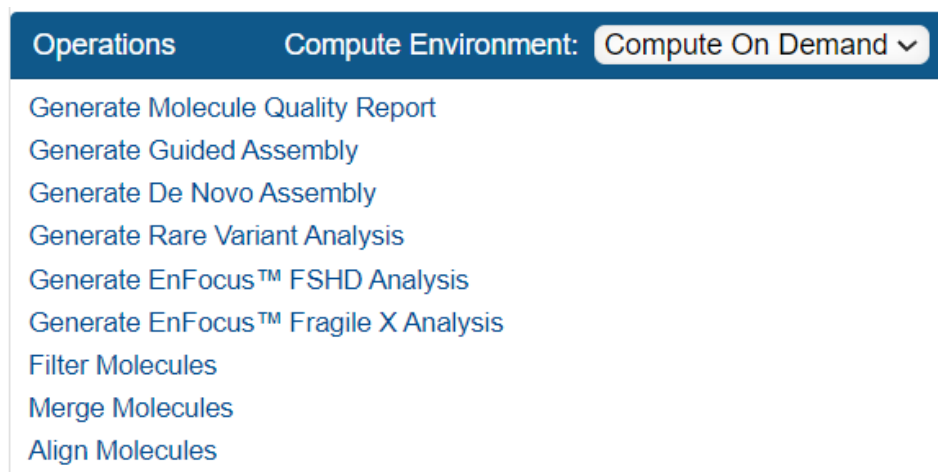
Figure 6. Options panel.

Tokens

When performing a Bionano Solve operation locally, users will first be prompted for the required inputs. When performing a **Bionano Compute On Demand** operation, the inputs are the same as the inputs with one addition: the token cost. To proceed, users must have sufficient tokens and the token cost must be approved. The token cost estimates will be a range. In the example shown in **Figure 7**, the cost estimate is between 4 and 6 tokens. When users approve the operation the maximum token cost (6 in this example) will be deducted from the token balance. When the job is completed, if the cost was less than the maximum token estimate, users will be refunded the difference. For example, if the job below were to cost four tokens upon completion, users would receive a message that two tokens have been returned to the token balance. It is guaranteed that the cost will not exceed the maximum token cost quoted.
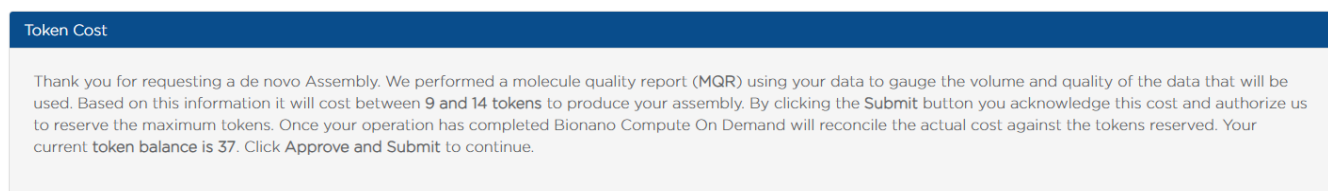
Figure 7. Token Cost pane.

Tokens to execute jobs on the Bionano Compute On Demand service can be acquired from the designated salesperson or by contacting orders@bionanogenomics.com. When users purchase tokens, they will receive one

or more voucher codes. Users can redeem a voucher by clicking on the **Compute On Demand** button on the main screen in Access (**Figure 8**). Based on demand, Bionano may restrict the sale of tokens to any region for those customers that operate in that region.

Figure 8. Compute On Demand button.

When a voucher is redeemed, all the tokens for that voucher are granted to the account for the user who is logged in. Any user who owns tokens can transfer them to other user accounts (except those with Read-Only access) on the same server. Tokens currently cannot be transferred between Bionano Access servers. Tokens cannot be taken they can only be given. Read-Only accounts cannot have tokens because they cannot perform operations.

Base Features / Benefits

Below is a brief description of new features and benefits of this release. For more detailed information on these new features, please refer to Bionano user manuals and video tutorials.

Table 1. New features and benefits of this release.

Feature	Description
Tokens	Token vouchers are used instead of direct payment methods for security reasons. By using tokens, no credit card information or payment methods are accessible through your Bionano Access server or Bionano Compute On Demand. Tokens are only available through the Bionano sales team or at orders@bionanogenomics.com. Depending on demand we may offer a self-serve voucher site in the future.
Estimate Ranges	Job token costs are presented to you in the form of a range. We believe you deserve to know the potential cost up front, but we also want to only charge you based on the actual cost. This way the user gets the best of both worlds. You are not charged more than the maximum stated, but if the job costs less, we will refund you the difference. Due to the complexity of the data, we process and the quality of your data, it is not always possible to predict the exact cost up front, hence we provide a range. We are continuously working on narrowing the range we provide.
Data Security	Data security is always a primary concern when you consider a hosted solution. A lot of care was given to our system design to provide the best assurances your data is protected. For more detailed information on data security please refer to our separate *Data Security Guidelines* (CG-30292). It is important to note that data is returned to your local Bionano Access server upon successful completion, and Bionano Compute On Demand does not retain protected data. When operations fail

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Feature	Description
	in Bionano Compute On Demand, data are retained temporarily within the Bionano Compute On Demand servers. You may authorize Bionano Support to view this data for the sole purpose of troubleshooting the failure. Whether or not you contact Bionano, this temporary data will be deleted pursuant to Bionano's procedures in effect at that time.
Bionano Access Integration	The Bionano Compute On Demand solution is integrated with Bionano Access. Results from Bionano Compute On Demand will function in Bionano Access the same as those from local Compute resources. Users already familiar with how to use Bionano Access will understand how to use Bionano Compute On Demand operations quickly, because they are nearly identical.
Encryption	All data transfers and communication to and from Bionano Compute On Demand are encrypted.
Agnostic Solution	Our cloud solution is provider agnostic. Our solution has been designed to leverage whichever cloud provider has the best value and meets our security requirements. We currently use Amazon's AWS and Microsoft's Azure.
Regional Assets	We offer different regional computing end points for a variety of reasons. Proximity to computing assets reduces upload and download times. Our solution is designed to utilize different data centers within a designated region based on best market price at the time of the operation.
Elastic Capacity	Each operation runs on its own independent Compute server(s). These Compute servers are requested when the operation is started, and they are terminated when the operation has been completed. There is no latency for your jobs to start. You are never queued behind other jobs. You always get a fresh environment of your own and your job starts and runs as soon as the appropriate Compute server is available.
Large Genome Support	Bionano's Saphyr Compute server ships with 256 GB of memory. This is sufficient to handle nearly all *de novo* assemblies, but there are some plant / animal genomes that require more memory. The Bionano Compute On Demand solution offers Compute nodes with 488 GB of memory for larger operations.
Performance	The Compute On Demand solution allocates Compute resources to your job based on the volume of data to be processed. This additional Compute power allows your job to process faster and cheaper.
Execution Silos	Each job runs on an independent set of Compute servers. Your job is not executed on a shared resource.
No System Updates	The Bionano Compute On Demand service is a hosted service so you do not need to apply or install periodic updates. All system updates for the Bionano Compute On Demand service are managed by Bionano.
System Health	When you sign up for the Bionano Compute On Demand service your Bionano Access system will share system health metrics with Bionano not including any protected data. This will allow Bionano to better support our customer base.

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Terms and Conditions

The terms and conditions that the system administrator has agreed to on user's behalf to enable a connection to Bionano Compute On Demand and/or Saphyr Assure are listed below. By using Bionano Compute On Demand and/or Saphyr Assure, users are bound to these terms and conditions.

- Users may only use Bionano Compute On Demand and Saphyr Assure to process data that is owned, licensed, or lawfully obtained by said user.

- Users must comply with the current Bionano technical documentation applicable to the data users send to the Bionano Compute On Demand. Noncompliance with this technical documentation may result in failure of operations that would not be reimbursable by Bionano.

- Genomic Data (i.e., BNX files) will be transferred from the user's local server to a hosted Bionano Compute On Demand resource for the purpose of computing in the cloud. These resources exist in AWS and/or Microsoft Azure datacenters and not on Bionano-owned infrastructure. The data is encrypted during transit to those datacenters. Refer to *Bionano Genomics Data Security Guidelines* (CG-30292) for details of the data that is transmitted.

- Upon successful completion, data are returned to the user's Bionano Access Server and are deleted from Bionano Compute On Demand.

- When operations fail in Bionano Compute On Demand, data are retained temporarily within the Bionano Compute On Demand servers. Users may authorize Bionano Support to view this data for the sole purpose of troubleshooting the failure. Whether or not users contact Bionano, this temporary data will be deleted pursuant to Bionano procedures in effect at that time.

- Tokens provided by Bionano are required to run operations in the Bionano Compute On Demand. Users will act ethically in procuring and using tokens and will not attempt to misuse or otherwise attempt to subvert the use of tokens.

- System health metrics will be transferred from the user's Saphyr system to Saphyr Assure that is hosted in a Microsoft Azure datacenter. The data is encrypted during transit to this datacenter. Refer to *Bionano Genomics Data Security Guidelines* (CG-30292) for details of the data that is transmitted.

- By enabling Bionano Compute On Demand and Saphyr Assure, users authorize Bionano to collect summary metrics to support billing, support, and product improvement. These metrics include information on the status of the user's Bionano Access and Saphyr system and are not shared with third parties. Bionano does not collect any protected health information nor user actual run data or pipeline results. Users can select Saphyr Assure Only without Compute On Demand. This enables the collection of the same summary metrics, but not allowing user genomic data (i.e., BNX file) to be sent to Bionano Compute On Demand.

- Users agree to receive emails from Bionano pertaining to Bionano Compute On Demand and Saphyr Assure system maintenance and upgrade events. Bionano does not share email with any third parties. These emails will be sent to the email addresses registered in the user's Bionano Access server and/or associated with the account within Bionano's systems.

- Bionano, at its sole discretion and without prior notice, may terminate access to the Bionano Compute On Demand and Saphyr Assure if users are not in compliance with the terms of use or otherwise behave in an illegal or unethical way.

What's New in this Release

Compute On Demand 1.4.1.1

- Support for running Solve 3.8.1.1 has been added.

Compute On Demand 1.4.1

- Compute On Demand capacity has been increased. This will reduce queuing times for North America and Europe.

Compute On Demand 1.4

- Introduced regional instance for Canada

Update Tickets

Version	Summary	Ticket
1.4.1	Upgrade to Core Sets	IW-923
1.4.1	Multi-Region Job Submission Improvement	IW-1039
1.4.1	[Fixed] Not pulling updated mutithreading file for Access 1.7 alignment jobs	IW-1052
1.4.1	[Fixed] Active jobs stuck without workers	IW-1064
1.4.1	[Fixed] Change results job to On Demand Pro	IW-1074
1.4.1	[Fixed] Carbon core type not available for Canada region	IW-1085

Token Ranges

Table 2 and **Table 3** identify the token ranges expected for each operation in the current release. There will be fluctuations in token pricing from release to release as Bionano continues to reduce costs and accelerate performance. Actual costs vary significantly across regions and are based on available cloud compute resources, which will be estimated at initiation of the job.

Table 2. Token Ranges (Human)

Operation	North America Tokens	Germany Tokens	Europe Tokens	Typical Processing Time

	Typical	Min/Max	Typical	Min/Max	Typical	Min/Max	
de novo Assembly, 400Gbp	8	1/17	16	1/34	8	1/24	12-24 hours
de novo Assembly, 800Gbp	10	1/20	18	1/44	10	1/26	18-50 hours
Rare Variant Analysis, 1500Gbp	5	3/25	12	3/25	6	3/25	10-20 hours
EnFocus™ FSHD/Fragile X	2	1/5	4	3/5	2	1/5	2-4 hours
Guided Assembly – Low Allele Frequency 1500Gbp	8	3/25	12	3/25	8	3/25	10-20 hours

Table 3. Token Ranges (Non-Human & Other)

	Min Tokens	Max Tokens	Comment
Non-Human / No Reference *de novo* Assembly	1	50	Below 300 Gbp
Non-Human / No Reference *de novo* Assembly	10	150	300 – 500 Gbp
Non-Human / No Reference *de novo* Assembly	20	250	500 – 1000 Gbp
Non-Human / No Reference *de novo* Assembly	30	400	1000 – 2000 Gbp
Non-Human / No Reference *de novo* Assembly	40	500	2000 – 3000 Gbp (Limit increased)
MQR	1	2	
Alignment	1	4	
Guided Assembly	3	25	

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Technical Assistance

For technical assistance, contact Bionano Technical Support.

You can retrieve documentation on Bionano products, SDS's, certificates of analysis, frequently asked questions, and other related documents from the Support website or by request through e-mail and telephone.

TYPE	CONTACT
Email	support@bionano.com
Phone	Hours of Operation: Monday through Friday, 9:00 a.m. to 5:00 p.m., PST US: +1 (858) 888-7663 Monday through Friday, 9:00 a.m. to 5:00 p.m., CET UK: +44 115 654 8660 France: +33 5 37 10 00 77 Belgium: +32 10 39 71 00
Website	www.bionano.com/support
Address	Bionano, Inc. 9540 Towne Centre Drive, Suite 100 San Diego, CA 92121

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