BiBiServ Run in the Cloud Userguide

Team BiBiServ

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Contents

1	Use	rguide - How to run an App in the Cloud	3
	1.1	What is the 'Run in the Cloud' feature?	3
	1.2	Why do I need the 'Run in the Cloud' feature?	3
	1.3	When should I use the 'Run in the Cloud' feature ?	4
	1.4	Prerequisites	5
		1.4.1 Amazon Security Credentials	6
		1.4.2 Amazon SSH-Keypair	7
	1.5	AWSCredentialsModule	8
	1.6	KeyChainModule	10
2	How	rto: Run a tool in the Cloud	12
	2.1	The 'Run in the Cloud' Wizard	12
	2.2	Stopping the Grid	16

1 Userguide - How to run an App in the Cloud

At the following pages you will get detailed information you will need to successfully outsource a tool calculation to Cloud.

1.1 What is the 'Run in the Cloud' feature ?

The *Run in the Cloud* feature is an implementation on the existing BiBiServ and offers the possibility of outsourcing e.g. bioinformatic-tool calculations to a Cloud provider. Within the *Run in the Cloud* feature the Cloud provider is hold by the **Amazon Web Services**. The bootable Cloud instances are called *Amazon Elastic Cloud* 2-instances (short: *EC2*). Outsourcing the tool operations to an Cloud provider will lighten the BiBiServ's load. The user is able to decide if he either wants to calculate on the BiBiServ (located in the Bielefeld University) or in the Cloud. Small operations still can be executed without doubts on the BiBiServ but time-consuming and complex calculations should rather be outsourced to the Cloud.

1.2 Why do I need the 'Run in the Cloud' feature ?

A lot of bioinformatic tools require a large amount of input data, which will usually take a big part of the BiBiServ-Server resources (figure [1]). Another problem at this point



Figure 1: BiBiServ resources sharing

is the estimated time each programm will take on the server while a lot of programms start calculating simultaneuously. To avoid a server collapse there is a resources limit for each user of 6 gigabyte RAM and 6 hours CPU-time.

To ensure the time and resources you will need for your calculation without any interceptions or resources-reductions, we recommend you to outsource your tool calculations to the Cloud.

Espacially if you hold several and huge amount of data already in the Cloud (e.g. in Amazon S3-buckets) your connection (Upload/Download) to the data will be faster as when you start your calculation at the BiBiServ located in Bielefeld.

The goal of *Run in the Cloud* is getting the software to the data, instead of data to the software.

1.3 When should I use the 'Run in the Cloud' feature ?

The following Flow-Chart will help you to decide when you should use the 'Run in the Cloud' feature.



Figure 2: Decision Helper: When to run a tool in the Cloud

1.4 Prerequisites

To complete an successfully cloud calculation there are just two important prerequisites the user needs to fulfil.

- 1. Valid *AWS-Credentials* [1.4.1] to login to the corresponding AmazonWebServices account.
- 2. A valid SSH-Keypair [1.4.2] to connect to the created Amazon-EC2 instance.

1.4.1 Amazon Security Credentials

Amazon offers different types of security credentials. Within the *Run in the Cloud* feature we will use the *Access keys* - validation. The Amazon Security Credentials in general let you interact with the Amazon Web Services. With those cerentails Amazon verifies who your are and whether you have permission to access the resources you are requesting. The credentials consists of an *AccessKey* and an *SecretKey* as you can see in the figure [3].



Figure 3: Amazon Secutiry Credentails example

Your personal credentials have to be stored in the *AWS-Credentials-Module* [1.5]! For further information on the Amazon Security Credentials please have a look at the official Amazon information pages located at http://docs.aws.amazon.com/general/ latest/gr/aws-sec-cred-types.html

1.4.2 Amazon SSH-Keypair

The Amazon Key pairs consist of a **public** and a **private** key. You will use the private key to create a digitial signature and AWS uses the corresponding public key to validate your signature. Those key pairs are only necessary for the use with the Amazon Elastic Cloud 2 (EC2) and the Amazon *CloudFront* which is not used in the 'Run in the Cloud' feature. The Amazon key pair files are ending with the **.pem** suffix. For further information about the Amazon key pairs please have a look at the official Amazon information pages located at http://docs.aws.amazon.com/general/latest/gr/aws-sec-cred-types.html

1.5 AWSCredentialsModule

At first the user needs to store valid AWS-Credentials at the *AWSCredentialsModule* which is located at the personal dashboard *MyBiBiServ* (figure [4]).

	BiBiServ	Log	iged in as testadmin / <u>My BiBiServ</u> / L
BiBiServ			Searc
er view:			Module M
AdminDBModule	AwsCredentials	BiBiToolsProperties	ChangePassword
Gives administators the possibility to access the database per gui.	AmazonWebService credential management.	View and Edit BiBiTools properties during runtime.	Change users password.
DeployConf	Developer Statistics	ItemMenuLinker	Items
Get deployment config for local usage.	This module gives you the possibilities to show statistics about your tools in different charts and tables.	Link all kind of items into the menu.	Import and deletion of items.
LinkedItem	News	StructureUpload	UserManagement

Figure 4: MyBiBiServ - Dashboard

After selecting the AwsCredentials-Module the user is able to see the already stored AwsCredentials, if they were be stored so far (figure [5]).

		Logged in as tes	stadmin / <u>My BiBiServ</u> / <u>Lo</u>
, en el	BiBiServ	(d)	Par ag
wsCredentialsModule	Aws Cradent	iale	
wsCredentialsModule Keyname	Aws Credent Accesskey	iais Sessiontoken	Used Key?
wsCredentialsModule Keyname No records found.	Aws Credent Accesskey	ials Sessiontoken	Used Key?

Figure 5: AWSCredentials Module

Within a single click the user is able to store the personal AwsCredentials which will be needed for the *Run in the Cloud* feature (figure [6]).

Figure 6: Add new AWSCredentials

After inserting the credentials a click on 'Submit' will store the users AwsCredentials.

1.6 KeyChainModule

After storing the AwsCredentials the user needs to store the presonal *SSH-Keyfile*. On the personal MyBiBiServ-dashboard there is also a module called *KeyChainMod-ule* which offers the user an overview about already stored SSH-Keyfiles and previous *Run in the Cloud* - Tasks (figure [7]).

and and	10					Logged in as te	estadmin / <u>N</u>	ly BiBiS	erv / Logout
		BiBiServ		1.78			2		Search ?
	your per	sonal SSH-Keys and offe	are an	oveniew about your	last Run in the (loud actions			ba
At the first datatable (Table of st Table of stored UniqueFolderI nore. Furthermore you are also a	ored SSI D (RITC) allowed to	I-Keypairs) you are able offers the posibility to cloredirect to your running	e to che heck th grid in	eck, delete and store the status of your creat stances in the cloud	your personal Sated cloud grids a	SH-Keyfiles when nd allows to stop	eby the seco them if they	ond data are not	itable needed an
or further information and a sim	ple howto	userguide please have	a look	at <u>BiBiServ Run-In-</u> T	he-Cloud - WikiP	age			
		Tabl	le of s	stored SSH-Key	pairs				
Filesize				Created on		Active	Edit	Show	
1671 bytes		2015-03-31 16:25:	46.02	7		~	+	م	
			Ad	d new Keypair					
		Table of	store	d UniqueFolder	ID (RITC)				
JobID		Created on		Unique	FolderID	Status	Stop	Grid	Redirec
gVx1yMiYSe2NSA1	2015	-04-02 01:31:37.867	,	ritc_622289352	2767464190	Finished	Sto	р	ಲಿ
nCUNEn6MSSmvHOe 2015-04		i-04-02 01:45:16.032	2	ritc_4377332255844851157		Finished	Stop		e ⁿ
FvtQKezWRVmsqAB	ezWRVmsqAB 2015-04-02 02:06:55.721			ritc_4822988448571020251		Finished	Stop		e
g4SgZrRI29MTe5H	2015	i-04-02 09:57:24.284	ł	ritc_910344845	8216076742	Finished	Finished Stop		e
Gop1EnMmR96xsVy	2015	i-04-02 10:17:49.471		ritc_242789854	5869979039	Finished	Sto	р	e

Figure 7: KeyChainModule

The first datatable shows the users already stored SSH-Keyfiles and offers the possibility to edit, show and delete the stored Keyfiles. Furthermore the users is able to store new SSH-Keyfiles. (figure [8])

ble to ch check t ng grid i	neck, delete and store your pe the status of your created clou nstances in the cloud.	ersonal SSH-I ud grids and a	Keyfiles whereby allows to stop the	the second da m if they are no	tatable ot needed any		
/e a look	at BiBiServ Run-In-The-Clou	ud - WikiPage	1			_	
ble of	stored SSH-Keypairs						
	Created on	Adding n	ew Keypair				×
5:46.02	27	SSH-Ke	y:	Datei auswählen Kei			
Ac	id new Keypair	Set to ac	ctive SSH-Key? x Not Active				
of stor	ed UniqueFolderID (RI	Store	Back				
	UniqueFolder	ID	Status	StopGrid	Redirect		_
67	ritc_622289352276746	64190	Finished	Stop	e ⁿ		
32	ritc_43773322558448	51157	Finished	Stop	e		
21	ritc_482298844857102	20251	Finished	Stop	e ⁿ		

Figure 8: Add new SSH-Keypair

After selecting the corresponding SSH-Keyfile and clicking on 'Store' the Keyfile will be stored immediately. All prerequisites are now fulfilled and the users is now able to start the *Run in the Cloud* feature.

2 Howto: Run a tool in the Cloud

Lets start outsourcing a tool calculation to the Cloud in a step-by-step explanation.

2.1 The 'Run in the Cloud' Wizard

A new 'Run in the Cloud'-tab will be shown at each tool the user selects (figure[9]). This tab will be shown after selecting a tool in the navigation-menu on the left side. The user needs to complete the whole wizard to successfully start a new grid in cloud.

and the second		<u>Login</u> / <u>Register</u>
	BiBiServ =	Search ?
Navigation Tools	Welcome Submission Run in the Cloud WebService	Download Manual
Education		
Administration	Run in the Cloud AWS-Credentials Grid-Selection Confirmation	Balance Income
	RITC	Dialign Dialign
	The feature 'Run in the Cloud' offers the possibility of outsourcing BiBiGrid-calculation to the Amazon Elastic- Cloud (EC2).	Wedservice Drangin Reset Session Run in the Cloud References Submission Reset Session Previous Results Download
	Within a few steps we'll help you setting up your personal EC2-Instance and start your grid-calculation out there.	WebService Usage Run in the Cloud Statuscodes license Submission Manual WebService <u>Manual</u> Bun in the Olawa <u>Bownload</u>
	(Click on 'Next' to start configuration)	NUI II UIC CIULU DOWINDAU
	Next >	

Figure 9: Run in the Cloud - Wizard

At first the stored AWSCredentials and SSH-Keypair will be checked before the user can proceed. (figure [10])

- 2. M		Logged in as testadmin / <u>My BiBiServ</u> / <u>Logo</u>
	BiBiServ	1. 10
sõn Alles ala		Search
vigation	Welcome Submission Run in the Cloud Web	Service Download Manual
Tools	References Reset Session	
Administration	Run in the Cloud AWS-Credentials Grid-Selection Confirmation	on References Run in the Cloud
	Step 1: Credentials-Check	Manual Submission
	At first we do need your AWS-Credentials to es the connection to your AmazonWebService-Ac	stablish count.
	Found AWS-Credentials! Please continue	Reset Session References WebService Usage Manual
	(Click on 'Next' to configure your grid)	Statuscodes Dialign
	< Back	Next > Impressum Dialign Download Run in the Cloud

Figure 10: Wizard - Credentials Check

After the credentials are checked the user needs to configure his preferred EC2instances espacially for his selected tool (figure [11]).

	BiBiServ	Logged in as testadmin / <u>My BiBiSery</u> / Lo
Tools Education Administration	Welcome Submission Run in the Cloud WebServit References Reset Session Run in the Cloud AW3-Credentials Grid-Selection Confirmation Grid-Settings Grid-Selection Confirmation Grid-Selection Confirmation	ce Download Manual
	Please select the region: * eu-west-1 Please select the MasterNode- Ec2InstanceType: * m3.xlarge	WebService Manual Reset Session Download Submission Dialign References Provious Results Immension WebService
	Please select the SlaveNode- Ec2InstanceType: *	Dialign Run in the Cloud Dialign Run in the Cloud Dialign Run in the Cloud References Manual
	Piease select the number of slaves: *	Run in the Cloud Statuscodes

Figure 11: Wizard - Grid Setup

At least the user can check the made configuration and confirm them with a click on 'Run' (figure [12]).

	Logged in as testadmin / <u>My BIBIServ</u> / Log BiBiServ Search
lavigation	Welcome Submission Run in the Cloud WebService Download Manual
 Tools 	References Reset Session
Administration	Run in the Cloud AWS-Credentials Grid-Selection Confirmation license Submission Confirmation Boxed Section Boxed Section
	Credentials set: true Credentials set: true Selected Region: eu-west-1 References
	Selected Master-Instance-Type: m3.xlarge Dialign hum in the Cloud Selected Slave-Instance-Type: m3.medium Dialign hum in the Cloud Number of Slaves: 4 Statuscodes
	(Click Submit to finish configuration)

Figure 12: Wizard - Check and Confirmation

Now the grid creation starts. When the creation finishes successfully a new button will appear which will redirect the user to the created EC2-instance. (figure [13])

Welcome	Submission	ritc	WebServ	vice I	Download	Ma					
Reset Sess	sion										
Run in the Cl	oud AWS-Creden	tials Gr	id-Selection	Confirm	nation						
Confirm	Confirmation										
ubuntu@	@\$BIBIGRID_M	IASTER	R			•					
The Gar http://eo	nglia Web Inter 2-54-155-28-72	face is a 2.eu-we	available at st-	t:							
1.comp	ute.amazonaws	.com/ga	anglia								
You car ./bibigrio	terminate the d -t QKcRxVd8	cluster a SeK13K	at any time b -o bibigri	with: id.prope	erties	-					
Grid-Cre	eation successf	ul! After	an Acces	sCheck	you are able	e					
	ect to your insta	ince in t	ne Cloud.			_					
AccessCheck and Connect											
(Click Subm	it to finish configruat	ion)									
		< Ba	ck 😐	Reset	Run!	O					

Figure 13: Wizard - Configuration success and connect to EC2-instance

After clicking on the *Connect* button the user gets to an BiBiServ-copy in the Amazon Web Cloud (figure [14]). The address in the browser indicates that the user is



Figure 14: Wizard - BiBiServ Copy in the Cloud

now located in the Amazon Web Cloud on an EC2-instance. At this BiBiServ-Copy the user is now allowed to start the tool calculation as usual.

2.2 Stopping the Grid

Once the grid has been started the mentioned KeyChainModule offers the user the possibility to stop the already started grid. (figure [15]).

KeyChainModule										bac
The SSH-KeyChainModule hold At the first datatable (Table of st (Table of stored UniqueFolder more. Furthermore you are also	s your per ored SSH D (RITC) allowed to	sonal SSH-Keys and offe I-Keypairs) you are able offers the posibility to ch redirect to your running	rs an overvie to check, del eck the statu grid instance:	w a ete s of s in	about your last Run in th and store your personal f your created cloud grids the cloud.	e Clou SSH- s and	Id actions. Keyfiles whereby allows to stop the	y the second d em if they are i	atat not r	able 1eeded any
For further information and a sim	ple howto	userguide please have a	look at <u>BiBi</u>	Sen	v Run-In-The-Cloud - Wi	kiPage	2			
		Table	e of stored	-						
Filesize			С		Stop-Cluster Dialog				×	Show
1671 bytes		2015-04-08 01:17:3	37.333		Stop Cluster Proce	edure				Q
			Add new		UniqueFolderID: ClusterID:	ritc_ QKo	750393537484 RxVd8SeK13F	17912954 (b		
		Table of	stored Uni							
JobID		Created on				_			4	Redirect
QKcRxVd8SeK13Kb	2015-0	04-08 13:17:05.478	ritc_7	50	3935374847912954		Running			E ²
4sGetREQOyThdxj	2015-0	04-08 12:36:06.626	ritc_6	30	3010863298362799		Finished	•		e
2vMYmvbRkWdqclg	2015-0	04-08 11:52:15.684	ritc_2	73	6896668456904109		Finished			e
nM1kzLuCSRq8C7A	2015-0	04-08 11:41:06.814	ritc_4	02	6112244637826587		Finished			e ⁿ
FxUC59ifTtK8iDz	2015-0	04-08 11:31:50.893	ritc_6	63	9324708603656869		Finished			E ²

Figure 15: KeyChainModule - Stop the Grid

Within a click on 'Stop Grid Now' the grid stops immediately (figure [16])

anoor to your running give	a	o ologia.				
erguide please have a lo	ook at <u>BiBiServ F</u>	Run-In-The-Cloud - WikiPage				-
Table of	of stored SSI	H-Keypairs				
	Creat	, Stop-Cluster Dialog				×
015-04-08 01:17:37	.333 Add new K	Stop Cluster Procedu OK: Alternative config f OK: Terminating cluste	re ile bibigrid.pro r with id: QKcF	perties will be RxVd8SeK13K	used. b	
Table of st	ored Uniqu	OK: Gathering informat OK: AutoScaling group	tion about the i found.	nstances invo	lved	
Created on		OK: Removing policies		-		
08 13:17:05.478	ritc_750	OK: The instances are moment	shutting down	. Please be pa	tient. This cai	h take a
08 12:36:06.626	ritc_630					
08 11:52:15.684	ritc_273					
08 11:41:06.814	ritc_40261	12244637826587	Finished	•	ಲೆ	
08 11:31:50.893	ritc_66393	324708603656869	Finished	-	ಲಿ	

Figure 16: KeyChainModule - Stop the Grid NOW

Once the grid successfully finishes, an info text will be displayed. The user can now be sure that the grid in the cloud has been shutdown (figure[17]).

le of stored SS	H-Keypairs					
Crea				tive	Edi	it
37.333	Stop-Cluster Dialog		*	~	×	
Add source IC	Stop Cluster Procedu	re				
Add new K	Stopping the Cluster:					
stored Uniqu	tored SSH-Keypairs Crea Stop-Cluster Dialog Stop Cluster Procedure Stopping the Cluster: Done! Close ritc_7503935374847912954 Running					
			/_//	Stop	Grid	R
ritc_7503	935374847912954	Running				

Figure 17: KeyChainModule - Stopping Grid done

If the user wants to redirect to the BiBiServ copy in the cloud again, a simple click on 'redirect' will do all the work (figure [18]). After a second the user is located in the Amazon Web Cloud on the EC2-instance (figure [14]).

KeyChainModule							back	
The SSH-KeyChainModule ho At the first datatable (Table o (Table of stored UniqueFold more. Furthermore you are al	olds your pers f stored SSH lerID (RITC)) so allowed to	sonal SSH-Keys and of -Keypairs) you are ab offers the posibility to redirect to your runnin	fers an le to ch check th g grid ir	overview about your last Run in the Clo eck, delete and store your personal SSH- he status of your created cloud grids and istances in the cloud.	ud actions. Keyfiles whereby allows to stop the	the second dat m if they are no	atable t needed any	
For further information and a	simple howto	userguide please have	e a look	at BiBiServ Run-In-The-Cloud - WikiPage	9			
		Ta	ble of	stored SSH-Keypairs				
Filesize			Created on	Activo Edi				
1671 bytes	2015-04-08 01:17			Redirect to EC2-Maschine?				
			Red	lirect to: http://ec2-54-155-28-72.eu	u-west-1.compu	te.amazonaws	.com:8080/dia	align
			в	ack Go!				
		Table	DT STOP	ea uniqueroiaenu (KITC)		_		
JobID	Created on			UniqueFolderID	Status	StopGrid	Redirect	
QKcRxVd8SeK13Kb	2015-04-08 13:17:05.478			ritc_7503935374847912954	Running	-		
4sGetREQOyThdxj	2015-04-08 12:36:06.626		ritc_6303010863298362799	Finished	-	e		
2vMYmvbRkWdqclg	2015-04-08 11:52:15.684			ritc_2736896668456904109	Finished		e	
nM1kzLuCSRq8C7A	2015-04-08 11:41:06.814			ritc_4026112244637826587	Finished	•	e	
FxUC59ifTtK8iDz	2015-04-08 11:31:50.893			ritc_6639324708603656869	Finished	-	e	

Figure 18: KeyChainModule - Redirect to EC2-instance again