



- CloudStack Integration

- UI and API Customization and Integration

- CloudStack Developer On Ramp

**May 3, 2012**

# What you will learn

- How to customize the CloudStack 3.0.x user interface
  - Showcase changes specific in the CSS to alter the look and feel of CloudStack
  - Showcase an example of how to add your own side navigation
  - Dealing with Cross Site Request Forgery (CSRF)
  - Simple Single Signon
  - Localization



# What you will learn

- Working with the API
  - Session Based Auth vs API Key Auth
  - How to sign a request with apiKey/secretKey
  - Asynchronous commands
  - Response Format
  - Pagination
- Q&A



- Customizing the CloudStack
- User Interface
- Editing the CSS
- Localization



Dashboard



Instances



Storage



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Accounts



Domains



Events



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Configuration



## General Alerts

[View all](#)

## System Alert

VM (name: i-5-1683-VM, id: 1683) stopped unexpecte...



## System Alert

Unable to restart r-1395-VM which was running on h...



## System Alert

Unable to restart r-1410-VM which was running on h...



## System Alert

Unable to restart i-31-1424-VM which was running o...



## System Alert

## Host Alerts



## Host Alert

VM (name: i-5-1683-VM, id: 1683) stopped unexpecte...



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Unable to restart r-1395-VM which was running on h...



## Host Alert

Unable to restart r-1410-VM which was running on h...



## Host Alert

Unable to restart i-31-1424-VM which was running o...



## Host Alert

## System Capacity

Zone: zone

Public IP  
2 / 4

Zone: zone

Reserved System IP  
40 / 10

Zone: zone

Storage Used  
15 GB / 50 GB

Zone: zone

Secondary Storage  
15 GB / 50 GB

Zone: zone

Domain Router  
100 / 30

Zone: zone

Host  
100 gHZ / 15.5 gHZ

CloudStack

0 Notifications

Default View

Project View

a

CITRIX

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To change the logo, edit the `.logo` style

To change the header, edit the `.header` style

To change the breadcrumb bar, edit the `.breadcrumb` style and it's elements.

To change the view all button, edit the `.dashboard.admin .dashboard-container.sub .button.view-all` style.

To change the navigation, edit the `.navigation ul li` style.

System Alert

System Alert

System Alert

System Alert

Host Alert

Host Alert

Host Alert

Host Alert

Host Alert

System Capacity

Zone: zone

Public 2 / 4

50%

Zone: zone

Storage 15 GB / 15 GB

10%

Zone: zone

Domain Router 100 / 30

25%

Reserved System IP 40 / 10

50%

Secondary Storage 15 GB / 50 GB

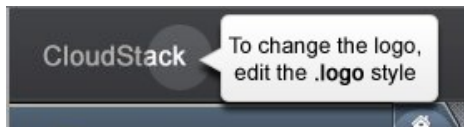
10%

Host 100 gHz / 15.5 gHz

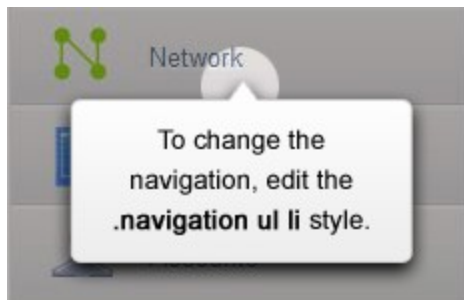
15%

To change the container tops, edit the `.dashboard.admin .dashboard-container.top` style.

- Editing the Logo, Navigation, and Title backgrounds



```
#header div.logo {  
  background: url("../images/logo.png")  
  no-repeat scroll 0 center transparent;  
  float: left;  
  height: 47px;  
  margin: 4px 0 0 19px;  
  position: relative;  
  width: 170px;  
}
```



```
#navigation ul li {  
  background: url("../images/bg-nav-item.png")  
  repeat-x scroll 0 0  
  transparent;  
  cursor: pointer;  
  height: 50px;  
  text-shadow: 0 1px 1px #FFFFFF;  
}
```



```
.dashboard.admin  
.dashboard-container .top {  
  background: url("../images/  
  bg-breadcrumb.png")  
  repeat-x scroll \0 -1px  
  transparent;  
  border-radius: 7px 7px 0 0;  
  color: #FFFFFF;  
  float: left;  
  margin: 0 0 9px;  
  padding: 4px 4px 8px;  
  width: 100%;  
}
```



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## Host Alert

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Public IP  
2 / 4

Zone: zone

Reserved System IP  
40 / 10

Zone: zone

Storage Used  
15 GB / 50 GB

Zone: zone

Secondary Storage  
15 GB / 50 GB

Zone: zone

Domain Router  
100 / 30

Zone: zone

Host  
100 gHZ / 15.5 gHZ





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## General Alerts

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Unable to restart r-1410-VM which was running on h...



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Unable to restart i-31-1424-VM which was running o...



## System Alert

Unable to restart i-53-1546-VM which was running o...

## Host Alerts



## Host Alert

VM (name: i-5-1683-VM, id: 1683) stopped unexpecte...



## Host Alert

Unable to restart r-1395-VM which was running on h...



## Host Alert

Unable to restart r-1410-VM which was running on h...



## Host Alert

Unable to restart i-31-1424-VM which was running o...



## Host Alert

Unable to restart i-53-1546-VM which was running o...

## System Capacity

Fetch latest

Zone: zone

Public IP  
2 / 4

Zone: zone

Reserved System IP  
40 / 10

Zone: zone

Storage Used  
15 GB / 50 GB

Zone: zone

Secondary Storage  
15 GB / 50 GB

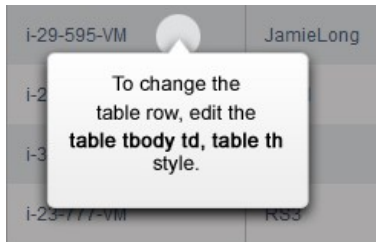
Zone: zone

Domain Router  
100 / 30

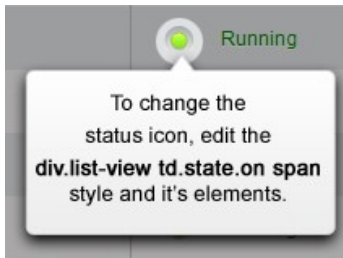
Zone: zone

Host  
100 gHZ / 15.5 gHZ

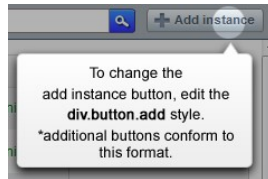
- Editing the tables, status icons, and buttons



```
table tbody td, table th, table tbody td {
  border-right: 1px solid #BFBFBF;
  clear: none;
  color: #495A76;
  font-size: 12px;
  min-width: 88px;
  overflow: hidden;
  padding: 9px 5px 8px 0;
  vertical-align: middle;
  background-color: #f2f0f1
}
```



```
div.list-view td.state.on span {
  background-image: url("../images/sprites.png");
  background-position: 1px -460px;
  background-repeat: no-repeat;
  color: #008000;
}
```



```
div.button.add {
  background: url("../images/gradients.png")

  repeat scroll 0 -98px transparent;
  border-left: 1px solid #808080;
  border-radius: 4px 4px 4px 4px;
  border-right: 1px solid #808080;
  color: #4A5A6D;
  cursor: pointer;
  float: right;
  font-size: 11px;
  font-weight: bold;
  height: 12px;
  left: 0;
  margin: 0 14px 0 0;
  padding: 5px 7px 5px 6px;
  position: relative;
  text-shadow: 0 1px 1px #DEE5EA;
  top: 5px;
```



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Filter by My instances



+ Add instance

| Name         | Account     | Zone     | Status  | Actions |
|--------------|-------------|----------|---------|---------|
| i-8-440-VM   | TEST        | San Jose | Running |         |
| i-15-449-VM  | RS4         | San Jose | Running |         |
| i-29-595-VM  | JamieLong   | San Jose | Running |         |
| i-20-622-VM  | cloud       | San Jose | Stopped |         |
| i-35-665-VM  | sumi        | San Jose | Stopped |         |
| i-23-777-VM  | RS3         | San Jose | Stopped |         |
| i-23-786-VM  | RS3         | San Jose | Stopped |         |
| i-23-805-VM  | RS3         | San Jose | Stopped |         |
| i-15-861-VM  | RS4         | San Jose | Stopped |         |
| i-16-901-VM  | RS5         | San Jose | Stopped |         |
| i-32-972-VM  | sumita-user | San Jose | Running |         |
| i-19-1030-VM | SCALR       | San Jose | Stopped |         |
| i-7-1118-VM  | DEV         | San Jose | Stopped |         |
| i-27-1274-VM | Yali        | San Jose | Running |         |
| i-2-1276-VM  | admin       | Chicago  | Running |         |
| i-23-1284-VM | RS3         | San Jose | Stopped |         |



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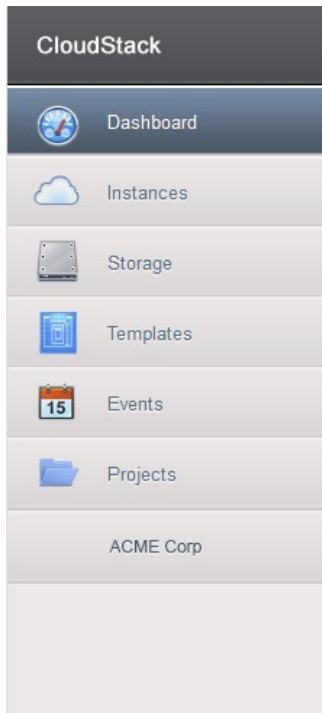
Filter by My instances



+ Add instance

| Name         | Account     | Zone     | Status  | Actions |
|--------------|-------------|----------|---------|---------|
| i-8-440-VM   | TEST        | San Jose | Running |         |
| i-15-449-VM  | RS4         | San Jose | Running |         |
| i-29-595-VM  | JamieLong   | San Jose | Running |         |
| i-20-622-VM  | cloud       | San Jose | Stopped |         |
| i-35-665-VM  | sumi        | San Jose | Stopped |         |
| i-23-777-VM  | RS3         | San Jose | Stopped |         |
| i-23-786-VM  | RS3         | San Jose | Stopped |         |
| i-23-805-VM  | RS3         | San Jose | Stopped |         |
| i-15-861-VM  | RS4         | San Jose | Stopped |         |
| i-16-901-VM  | RS5         | San Jose | Stopped |         |
| i-32-972-VM  | sumita-user | San Jose | Running |         |
| i-19-1030-VM | SCALR       | San Jose | Stopped |         |
| i-7-1118-VM  | DEV         | San Jose | Stopped |         |
| i-27-1274-VM | Yali        | San Jose | Running |         |
| i-2-1276-VM  | admin       | Chicago  | Running |         |
| i-23-1284-VM | RS3         | San Jose | Stopped |         |

## • Adding navigation buttons and functionality



1. Go to `/ui/scripts/cloudStack.js`

3. Add a new section to the array:

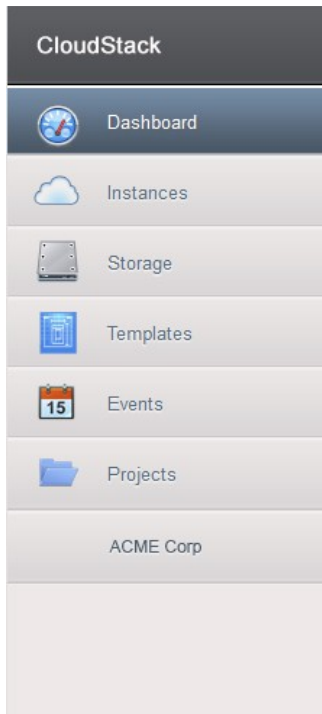
```
sections: {  
  /**  
   * Dashboard  
   */  
  dashboard: {},  
  //'dashboard-user': {},  
  instances: {},  
  storage: {},  
  network: {},  
  templates: {},  
  events: {},  
  accounts: {},  
  domains: {},  
  system: {},  
  projects: {},  
  'global-settings': {},  
  configuration: {},
```

```
  // New section  
  testSection: {}  
}
```

2. Find the sections array:

```
sections: {  
  /**  
   * Dashboard  
   */  
  dashboard: {},  
  //'dashboard-user': {},  
  instances: {},  
  storage: {},  
  network: {},  
  templates: {},  
  events: {},  
  accounts: {},  
  domains: {},  
  system: {},  
  projects: {},  
  'global-settings': {},  
  configuration: {}  
}
```

- Adding navigation buttons and functionality



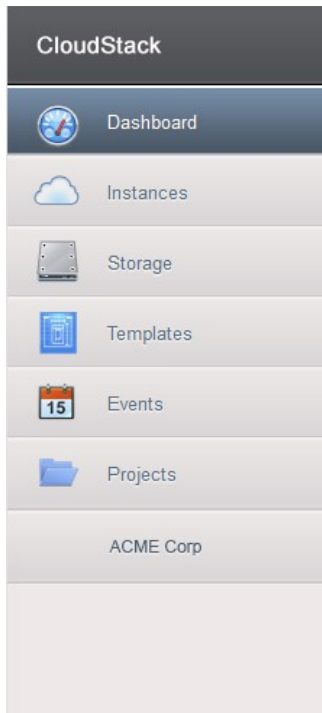
4. Open `/ui/index.jsp`. Create HTML somewhere in the 'template' div to contain your HTML content, which will be drawn in the browser pane:

```
<!-- Templates -->
<div id="template">
  <div class="testSection-tmpl">
    <h1>Test section</h1>
  </div>
</div>
```

5. Enclose a function in 'testSection', which returns a jQuery object containing your template code, and whatever other content you wish to be shown:

```
sections: {
  /**
   * Dashboard
   */
  dashboard: {},
  // 'dashboard-user': {},
  instances: {},
  storage: {},
  network: {},
  templates: {},
  events: {},
  accounts: {},
  domains: {},
  system: {},
  projects: {},
  'global-settings': {},
  configuration: {},
  // New section
  testSection: {
    title: 'Title for section',
    show: function(args) {
      return $('#template .testSection-
tmpl').clone();
    }
  }
}
```

- Adding navigation buttons and functionality



**6. Add the section to the pre-filter, so that it isn't filtered out for the admin account:**

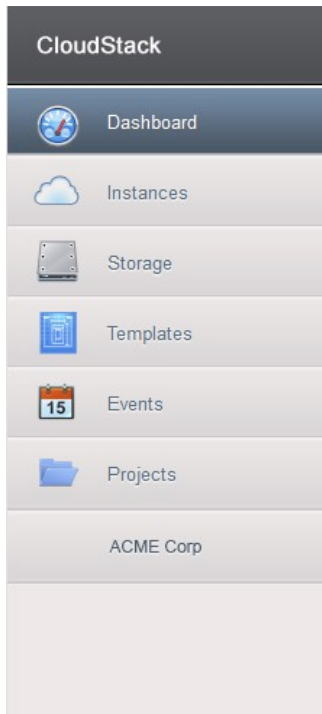
--

```
sectionPreFilter: function(args) {  
  if(isAdmin()) {  
    return ["dashboard", "instances", "storage", "network", "templates",  
"accounts", "domains", "events", "system", "global-settings", "configuration",  
"projects"];  
  },  
}
```

```
sectionPreFilter: function(args) {  
  if(isAdmin()) {  
    return ["dashboard", "instances", "storage", "network", "templates",  
"accounts", "domains", "events", "system", "global-settings", "configuration",  
"projects",  
  
    // New section  
    "testSection"];  
  },  
}
```

...

- Adding navigation buttons and functionality



**7. (optional)** Add an icon for your new section in the CSS, either at the bottom of `/ui/css/cloudstack3.css` or in your own CSS file under `/ui/css` folder. Make sure the size of the icon is `~32x32` pixels:

```
#navigation ul li.testSection span.icon {  
    background: url('../images/testSection-icon.png') no-repeat 0px 0px;  
}
```





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Service Offerings



## General Alerts

[View all](#)**Usage Server**

No usage server process running

**Secondary Storage VM**

Secondary Storage Vm rebooted in zone: zone, secSt...

**Management Server**

Management network CIDR is not configured original...

**Management Server**

Management server node 127.0.0.1 is up

## Host Alerts

**nfs://10.223.110.232/export/home/bfederle/secondar...**  
Alert state detected

## System Capacity

[Fetch latest](#)

Zone: zone

**label.management.Ips**  
3 / 11Zone: zone  
Pod: pod**label.management.Ips**  
3 / 11

Zone: zone

**CPU**  
1.00 GHz / 9.04 GHzZone: zone  
Pod: pod**CPU**  
1.00 GHz / 9.04 GHzZone: zone  
Pod: pod  
Cluster: xen-cluster**CPU**  
1.00 GHz / 9.04 GHz

Zone: zone

**Memory**  
1.25 GB / 14.84 GBZone: zone  
Pod: pod**Memory**  
1.25 GB / 14.84 GBZone: zone  
Pod: pod  
Cluster: xen-cluster**Memory**  
1.25 GB / 14.84 GB



Dashboard



Instances



Title for section



Storage



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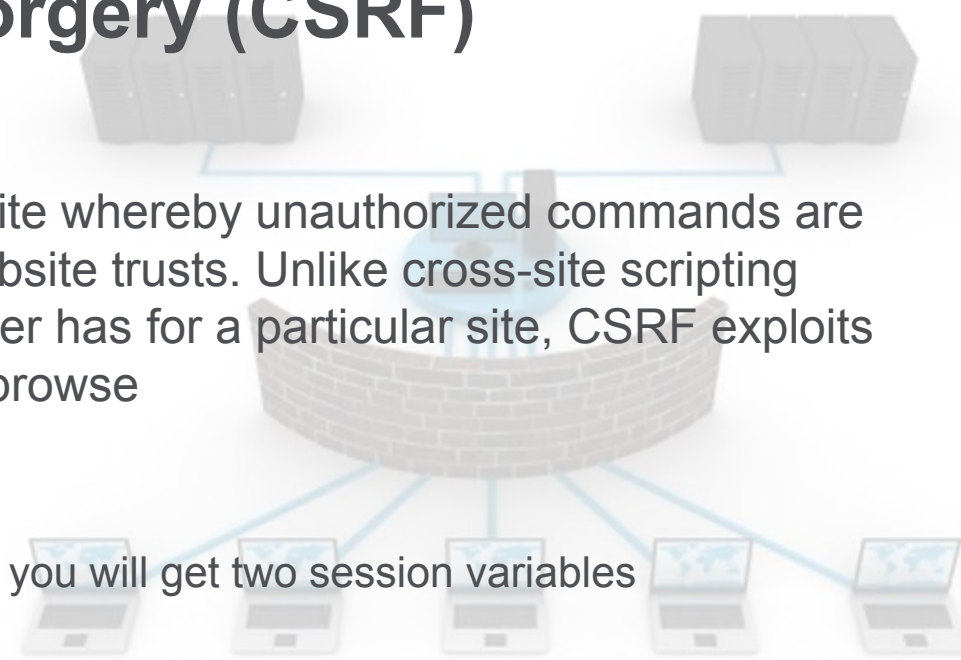
Service Offerings



Title for section

# Test Section

# Cross Site Request Forgery (CSRF)



- Type of malicious exploit of a website whereby unauthorized commands are transmitted from a user that the website trusts. Unlike cross-site scripting (XSS), which exploits the trust a user has for a particular site, CSRF exploits the trust that a site has in a user's browser
- What does CS do to prevent this?
  - After execution of the login command you will get two session variables
    - JSESSIONID – default cookie
    - SESSIONKEY – random token that is passed along every API request
      - `http://<API URL>?sessionkey=<SESSIONKEY>&...`

# Simple Single Signon

`http://<api_url>?  
command=login&username=XXX&domainid=NNN&timestamp=YYY&signature=  
<secure-hash>`

- You do not need to pass in the API Key
- The four parameters that must be passed in for the login command are domainId, username, timestamp, and signature
- `security.singlesignon.key`
- `security.singlesignon.tolerance.millis`
- SAML?



# Localization

- Support for Japanese and Simplified Chinese
- Takes advantage of the Java ResourceBundle to do localization
- Simply create a /WEB-INF/classes/resources/messages\_<language code>.properties
- Server side vs Client side processing



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- API

# Session-based Auth vs API Key Auth

- CloudStack supports two ways of authenticating via the API.
- Session-based Auth
  - Uses default Java Servlet cookie based sessions
  - Use the “login” API to get a JSESSIONID cookie and a SESSIONKEY token
  - All API commands require both cookie and token to authenticate
  - Has a timeout as configured within Tomcat
- API Key Auth
  - Works similarly to AWS API
  - Requires a bit more coding to generate the signature

# SIGNING REQUEST WITH API KEY / SECRET KEY

`http://localhost:8080/client/api/?` - **HOST NAME AND PATH**

`command=createVolume&` - **COMMAND NAME**

`diskOfferingId=1&name=smallVolume&zoneId=1&` - **PARAMETERS**

`apiKey=VNWijJSOzO9ZS-gxTyIYftb2mO57yRkCwQuFS_8uQQXJZb5HMEVMOAvoQf2SoXPw9JNMPxycBIYG0PsDynHVhQ&` - **API KEY**

`signature=SyjAz5bggPk08I1DE34rlnH9x%2F4%3D` - **SIGNATURE**

Step 1:

`commandString = command name + parameters + api key`

URL encode each field-value pair within the commandstring

Step 2:

Lower case the entire `commandString` and sort it alphabetically via the field for each field-value pair.

`sortedCommandString : apiKey=vmwiji...`

`&command=createvolume&diskofferingid=1&name=smallvolume=zoneid=1`

Step 3:

Take the `sortedCommandString` and run it through the HMAC SHA-1 hashing algorithm (most programming languages offer a utility method to do this) with the user's Secret Key. Base64 encode the resulting byte array in UTF-8 so that it can be safely transmitted via HTTP. The final string produced after Base64 encoding should be `SyjAz5bggPk08I1DE34rlnH9x%2f4%3D`



# Asynchronous Commands

- Starting with 3.0, in your standard CRUD (Create, Read, Update, Delete) of any first class objects in CloudStack, CUD are automatically asynchronous. R is synchronous.
- Rather than returning a response object, it will return a job ID.
- If it is a “Create” command, it will also return the object ID.
- With the job ID, you can query the async job status via the `queryAsyncJobResult` command.
- The `queryAsyncJobResult` response will return the following possible job status code:
  - 0 - Job is still in progress. Continue to periodically poll for any status changes.
  - 1 - Job has successfully completed. The job will return any successful response values associated with command that was originally executed.
  - 2 - Job has failed to complete. Please check the `<jobresultcode>` tag for failure reason code

# RESPONSE FORMAT

CloudStack supports two formats as the response to an API call.

The default response is XML. If you would like the response to be in JSON, add &response=json to the Command String.

Sample XML Response:

```
<listipaddressesresponse>
  <allocatedipaddress>
    <ipaddress>192.168.10.141</ipaddress>
    <allocated>2009-09-18T13:16:10-0700</allocated>
    <zoneid>4</zoneid>
    <zonename>WC</zonename>
    <issourcenat>true</issourcenat>
  </allocatedipaddress> </listipaddressesresponse>
```

Sample JSON Response:

```
{ "listipaddressesresponse" : { "allocatedipaddress" : [ { "ipaddress" : "192.168.10.141", "allocated" : "2009-09-18T13:16:10-0700", "zoneid" : "4", "zonename" : "WC", "issourcenat" : "true" } ] }
```

# Pagination

- Using the page and pagesize parameter
  - page defines the current cursor to the list
  - pagesize defines the number of items per request
  - Pagesize is limited by the administrator
  - Sample:
    - `listVirtualMachines&page=1&pagesize=500`
    - `listVirtualMachines&page=2&pagesize=500`

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· Q&A