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2 snapshot

2.1

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1      # nova/api/openstack/compute/servers.py Controller._action_create_image()
2      def _action_create_image(self, req, id, body):
3          # id instance id
4          context = req.environ['nova.context']
5          # body == {u'createImage': {u'name': u'snap1', u'metadata': {}}}
6          entity = body.get("createImage", {})
7
8          image_name = entity.get("name")
9
10         ...
11
12         props = {}
13         metadata = entity.get('metadata', {})
14
15         try:
16             props.update(metadata)
17             ...
18         # context req Instance
19         instance = self._get_server(context, req, id)
20
21         bdms = objects.BlockDeviceMappingList.get_by_instance_uuid(
22             context, instance.uuid)
23
24         try:
25             # root volume
26             if self.compute_api.is_volume_backed_instance(context, instance,
27                                                         bdms):
28                 img = instance['image_ref']
29                 if not img:
30                     properties = bdms.root_metadata(
31                         context, self.compute_api.image_api,
32                         self.compute_api.volume_api)
33                     image_meta = {'properties': properties}
34                 else:
35                     image_meta = self.compute_api.image_api.get(context, img)
36
37             # Snapshot the given volume backed instance
38             image = self.compute_api.snapshot_volume_backed(
39                 context,
40                 instance,
41                 image_meta,

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42                                     image_name,
43                                     extra_properties=props)
44     else:
45         #
46         image = self.compute_api.snapshot(context,
47                                           instance,
48                                           image_name,
49                                           extra_properties=props)
50     ...
51
52     # build location of newly created image entity
53     image_id = str(image['id'])
54     url_prefix = self._view_builder._update_glance_link_prefix(
55         req.application_url)
56     image_ref = os.path.join(url_prefix,
57                              context.project_id,
58                              'images',
59                              image_id)
60
61     resp = webob.Response(status_int=202)
62     resp.headers['Location'] = image_ref
63     return resp

```

2.2 RPC nova-compute

```

1  # nova/compute/api.py API.snapshot()
2  def snapshot(self, context, instance, name, extra_properties=None):
3      # instance: nova.db.sqlalchemy.models.Instance
4      # name: name of the snapshot
5      # extra_properties: dict of extra image properties to include
6      # when creating the image.
7      # returns: A dict containing image metadata
8
9      # Create new image entry in the image service.
10     # This new image will be reserved for the compute
11     # manager to upload a snapshot or backup.
12     image_meta = self._create_image(context, instance, name,
13                                     'snapshot',
14                                     extra_properties=extra_properties)
15
16     # instance task_state
17     instance.task_state = task_states.IMAGE_SNAPSHOT_PENDING
18     # Instance.save()
19     instance.save(expected_task_state=[None])
20
21     self.compute_rpcapi.snapshot_instance(context, instance,
22                                           image_meta['id'])
23
24     return image_meta

```

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1  # nova/compute/rpcapi.py ComputeAPI.snapshot_instance()
2  def snapshot_instance(self, ctxt, instance, image_id):

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{

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3      # server: the destination host for a message.
4      # server == instance['host']
5      cctxt = self.client.prepare(server=_compute_host(None, instance),
6                                  version=version)
7      cctxt.cast(ctxt, 'snapshot_instance',
8                  instance=instance,
9                  image_id=image_id)

```

2.3 nova-compute

```

1      # nova/compute/manager.py ComputeManager.snapshot_instance()
2      def snapshot_instance(self, context, image_id, instance):
3          # context: security context
4          # instance: a nova.objects.instance.Instance object
5          # image_id: glance.db.sqlalchemy.models.Image.Id
6          try:
7              # instance task_state
8              instance.task_state = task_states.IMAGE_SNAPSHOT
9              # Instance.save()
10             instance.save(
11                 expected_task_state=task_states.IMAGE_SNAPSHOT_PENDING)
12         ...
13
14         self._snapshot_instance(context, image_id, instance,
15                                 task_states.IMAGE_SNAPSHOT)

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1      # nova/compute/manager.py ComputeManager._snapshot_instance()
2      def _snapshot_instance(self, context, image_id, instance,
3                              expected_task_state):
4          # self.driver.get_info(instance)["state"]
5          current_power_state = self._get_power_state(context, instance)
6          try:
7              # instance power_state
8              instance.power_state = current_power_state
9              instance.save()
10             if instance.power_state != power_state.RUNNING:
11                 state = instance.power_state
12                 running = power_state.RUNNING
13             def update_task_state(task_state,
14                                   expected_state=expected_task_state):
15                 instance.task_state = task_state
16                 instance.save(expected_task_state=expected_state)
17             # LibvirtDriver.snapshot()
18             self.driver.snapshot(context, instance, image_id,
19                                  update_task_state)
20
21             # instance
22             instance.task_state = None
23             instance.save(expected_task_state=task_states.IMAGE_UPLOADING)
24         ...

```

2.4

```

1  def snapshot(self, context, instance, image_id, update_task_state):
2      try:
3          #      virConnect.lookupByName()      virDomain
4          virt_dom = self._lookup_by_name(instance['name'])
5          ...
6
7          base_image_ref = instance['image_ref']
8
9          #      instance image
10         base = compute_utils.get_image_metadata(
11             context, self._image_api, base_image_ref, instance)
12
13         # Retrieves the information record for a single disk image by image_id
14         snapshot = self._image_api.get(context, image_id)
15
16         #      virtDomain.XMLDesc(0)      xml      instance
17         disk_path = libvirt_utils.find_disk(virt_dom)
18         #      qemu img info disk_path
19         source_format = libvirt_utils.get_disk_type(disk_path)
20
21         image_format = CONF.libvirt.snapshot_image_format or source_format
22
23         # NOIE(bfilippov): save lvm and rbd as raw
24         if image_format == 'lvm' or image_format == 'rbd':
25             image_format = 'raw'
26
27         # metadata = {'is_public': False,
28         #              'status': 'active',
29         #              'name': snp_name,
30         #              'properties': {
31         #                  'kernel_id': instance['kernel_id'],
32         #                  'image_location': 'snapshot',
33         #                  'image_state': 'available',
34         #                  'owner_id': instance['project_id'],
35         #                  'ramdisk_id': instance['ramdisk_id'],
36         #              }
37         #
38         metadata = self._create_snapshot_metadata(base,
39                                                     instance,
40                                                     image_format,
41                                                     snapshot['name'])
42
43         #
44         snapshot_name = uuid.uuid4().hex
45
46         # LIBVIRT_POWER_STATE = {
47         #     VIR_DOMAIN_NOSTATE: power_state.NOSTATE,
48         #     VIR_DOMAIN_RUNNING: power_state.RUNNING,
49         #     VIR_DOMAIN_BLOCKED: power_state.RUNNING,
50         #     VIR_DOMAIN_PAUSED: power_state.PAUSED,
51         #     VIR_DOMAIN_SHUTDOWN: power_state.SHUTDOWN,
52         #     VIR_DOMAIN_SHUTOFF: power_state.SHUTDOWN,
53         #     VIR_DOMAIN_CRASHED: power_state.CRASHED,

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54     # VIR_DOMAIN_PMSUSPENDED: power_state.SUSPENDED,
55     # }
56     # virDomain.info() [state, maxMemory, memory, nbVirtCPU, cpuTime]
57     state = LIBVIRT_POWER_STATE[virt_dom.info()[0]]
58
59     # QEMU 1.3 and Libvirt 1.0.0
60     # Instances with LVM encrypted ephemeral storage
61     if (self._has_min_version(MIN_LIBVIRT_LIVESNAPSHOT_VERSION,
62                               MIN_QEMU_LIVESNAPSHOT_VERSION,
63                               REQ_HYPERVISOR_LIVESNAPSHOT)
64         and source_format not in ('lvm', 'rbd')
65         and not CONF.ephemeral_storage_encryption.enabled):
66         live_snapshot = True
67         try:
68             # active block job
69             virt_dom.blockJobAbort(disk_path, 0)
70             ...
71         else:
72             live_snapshot = False
73
74     if state == power_state.SHUTDOWN:
75         live_snapshot = False
76
77     # virDomain.managedSave() does not work for LXC
78     # virDomain.managedSave()
79     if CONF.libvirt.virt_type != 'lxc' and not live_snapshot:
80         if state == power_state.RUNNING or state == power_state.PAUSED:
81             # pci
82             self._detach_pci_devices(virt_dom,
83                                     pci_manager.get_instance_pci_devs(instance))
84             # SR IOV
85             self._detach_sriov_ports(context, instance, virt_dom)
86             # This method will suspend a domain and save its memory contents to
87             # a file on disk.
88             virt_dom.managedSave(0)
89
90     # Qcow2
91     # snapshot_backend nova.virt.libvirt.imagebackend.Qcow2 object
92     snapshot_backend = self.image_backend.snapshot(instance,
93                                                    disk_path,
94                                                    image_type=source_format)
95     ...
96
97     update_task_state(task_state=task_states.IMAGE_PENDING_UPLOAD)
98     # snapshot_directory == /var/lib/nova/instances/snapshots
99     snapshot_directory = CONF.libvirt.snapshots_directory
100     #
101     fileutils.ensure_tree(snapshot_directory)
102     with utils.tmpdir(dir=snapshot_directory) as tmpdir:
103         try:
104             #
105             out_path = os.path.join(tmpdir, snapshot_name)
106             if live_snapshot:
107                 os.chmod(tmpdir, 0o701)
108             #

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109         # disk_path /var/lib/nova/instances/vm uuid/disk
110         # out_path /var/lib/nova/instances/snapshots/snapshot_name
111         #         qemu img create f qcow2 o backing_file=disk_path
112             backing_file,size=disk_path virtual_size out_path.delta
113
114         #         domain.blockRebase(disk_path, disk_delta, 0,
115         #         libvirt.VIR_DOMAIN_BLOCK_REBASE_COPY |
116         #         libvirt.VIR_DOMAIN_BLOCK_REBASE_REUSE_EXT |
117         #         libvirt.VIR_DOMAIN_BLOCK_REBASE_SHALLOW)
118         disk_path out_path.delta
119         #         qemu img convert out_path.delta
120         out_path
121         #
122
123         self._live_snapshot(virt_dom, disk_path, out_path,
124                             image_format)
125     else:
126         #         qemu img convert out_path
127         #
128         #
129         # -x
130
131         snapshot_backend.snapshot_extract(out_path, image_format)
132     finally:
133         new_dom = None
134         # NOTE(dkang): because previous managedSave is not called
135         #         for LXC, _create_domain must not be called.
136         if CONF.libvirt.virt_type != 'lxc' and not live_snapshot:
137             if state == power_state.RUNNING:
138                 #         new_dom == virt_dom
139                 new_dom = self._create_domain(domain=virt_dom)
140             elif state == power_state.PAUSED:
141                 #         new_dom == virt_dom.createWithFlags(libvirt.
142                     VIR_DOMAIN_START_PAUSED)
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