

# Openembedded Yocto Linux and Consul Integration using Qemu

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## Contents

Openembedded Yocto Linux and Consul Integration using Qemu .....	1
Problem 1: .....	2
Solution of Problem1: .....	2
1.1 Consul DB: .....	2
1.2 Yocto Project: .....	2
1.3 Steps involved in Problem 1: .....	2
1.3.3 Possible Solutions: .....	4
1.3.5.1 Using devtool to generate recipe for Consul i386 binary from poky workspace: .....	4
1.3.5.2 Verified the devtool generated Consul recipe contents: <i>consul064386binv1_0.6.4.bb</i> : .....	4
1.3.5.3 Build new Recipe or rebuild the existing qemu86 default Image .....	5
1.3.5.4 Turn on the existing default image qemu86 .....	6
1.3.5.5 Deployed newly build consul064386binv1 recipe into directly to the running target qemu86 emulation .....	7
1.3.5.6 Data Integrity with new consul recipe contents: .....	9
1.3.5.6.2 consul binary: .....	10
1.3.5.6.3 consul new recipe contents: .....	10
1.3.5.6.4 Default workspace layer contents: .....	11
Problem 2: .....	11
Solution of Problem 2: .....	11
2.1 Yocto BSP SDK tools can be leveraged for qemu: .....	11
2.2 Source the environment in order to create or build a BSP: .....	11
2.3 Calling new target machine 'jqgemux86v1' and will invoke 'yocto-bsp create' .....	12
2.4 Add the new Consul BSP layer to BBLAYERS .....	13
2.5 Inline modified layer configuration: <i>conf/local.conf</i> : .....	14
2.5 Using <i>meta/recipes-sato/images/core-image-sato.bb</i> for new image building: .....	18
2.6 Building the new image jqgemux86v1 with recipe <i>consul064386binv1</i> : .....	18
2.7 Verified the newly build kernel and rootfs image: .....	22
2.8 Tree structure post new image build completion before deployment: .....	23
2.9 Running the new image jqgemux86v1 with new kernel and rootfs: .....	24
2.10 Verified the source <i>consul-i386</i> source binary and destination target: .....	26

## Development project using Yocto

Yocto as a possible openembedded platform for open source embedded products in the future. Yocto is a set of tools and processes to create custom Linux distributions for embedded products independent from the underlying hardware architecture with minimal efforts in integration in cross vendor integration. Yocto solves this problem using recipe, which provides information about packages, dependencies, where the source code resides, how to build the package and more.

---

## Problem 1:

Consul is a distributed key/value store for distributed NoSQL database. Unfortunately there is no recipe for Consul to date in Yocto distribution. We would like you to write a Yocto recipe for Consul to understand the porting efforts required for any unknown third-party vendor when source code repository and direct binary integration effort involved.

## Solution of Problem1:

### 1.1 Consul DB:

It is a [HashiCorp](https://www.consul.io) product hosted by [www.consul.io](https://www.consul.io) and maintained with [Golang](https://golang.org/). Consul is publicly available in multiple variants:

- 1.1.1 Latest and stable Binary Release: 0.6.4 release: Direct target platform binary under <https://www.consul.io/downloads.html> for several common architectures.
- 1.1.2 Open source Git Repository: 0.6.2 and master branch release : [no 0.6.4 git tag found] <https://github.com/hashicorp/consul>.
- 1.1.3 Consul Support tools under [https://www.consul.io/downloads\\_tools.html](https://www.consul.io/downloads_tools.html) and [https://releases.hashicorp.com/consul/0.6.4/consul\\_0.6.4\\_web\\_ui.zip](https://releases.hashicorp.com/consul/0.6.4/consul_0.6.4_web_ui.zip).

### 1.2 Yocto Project:

It is a joint collaboration effort by [openembedded](https://openembedded.org/), [Linux Foundation](https://www.linuxfoundation.org/) and many other partners to jointly develop hardware architecture independent embedded Linux solutions with generic templates, tools, solutions and it supports extensible [SDKs](https://www.yoctoproject.org/docs/2.1.0/yocto-project-4/yocto-project-4.html).

### 1.3 Steps involved in Problem 1:

1.3.1 We referred [Setting Up to Use the Yocto Project](https://www.yoctoproject.org/docs/2.1.0/yocto-project-4/yocto-project-4.html) reference to configure our hosting platform.

1.3.2 To setup yocto latest poky 2.1 revision, we used Ubuntu 14.04 LTS x64 as Host platform and setup poky latest [git://git.yoctoproject.org/poky](https://git.yoctoproject.org/poky) under krogoth2.1 branch.

```
sam1@sam1p1 192.168.2.3 ~/pers/test_proj1/yocto/poky/krogoth2.1/poky [Tue May 17 13:21:25]
$ cat .git/config
[core]
```

```
repositoryformatversion = 0
filemode = true
bare = false
logallrefupdates = true
[remote "origin"]
  url = git://git.yoctoproject.org/poky
  fetch = +refs/heads/*:refs/remotes/origin/*
[branch "krogoth"]
  remote = origin
  merge = refs/heads/krogoth
```

sam1@sam1p1 192.168.2.3 ~/pers/test\_proj1/yocto/poky/krogoth2.1/poky [Mon May 16 19:23:56]

\$ ll

total 96

```
drwxrwxr-x 3 sam1 sam1 4096 May 14 21:21 ..
-rw-rw-r-- 1 sam1 sam1 65 May 14 21:36 .templateconf
-rw-rw-r-- 1 sam1 sam1 19154 May 14 21:36 README.hardware
-rw-rw-r-- 1 sam1 sam1 2467 May 14 21:36 README
-rw-rw-r-- 8 sam1 sam1 515 May 14 21:36 LICENSE
-rw-rw-r-- 1 sam1 sam1 480 May 14 21:36 .gitignore
drwxrwxr-x 6 sam1 sam1 4096 May 14 21:36 bitbake
drwxrwxr-x 14 sam1 sam1 4096 May 14 21:36 documentation
drwxrwxr-x 7 sam1 sam1 4096 May 14 21:36 meta-selftest
drwxrwxr-x 5 sam1 sam1 4096 May 14 21:36 meta-poky
drwxrwxr-x 8 sam1 sam1 4096 May 14 21:36 meta-yocto-bsp
drwxrwxr-x 3 sam1 sam1 4096 May 14 21:36 meta-yocto
drwxrwxr-x 7 sam1 sam1 4096 May 14 21:36 meta-skeleton
-rwxrwxr-x 1 sam1 sam1 2559 May 14 21:36 oe-init-build-env-memres
-rwxrwxr-x 1 sam1 sam1 2121 May 14 21:36 oe-init-build-env
drwxrwxr-x 20 sam1 sam1 4096 May 14 21:36 meta
drwxrwxr-x 8 sam1 sam1 4096 May 14 21:36 scripts
drwxrwxr-x 13 sam1 sam1 4096 May 14 21:51 .
drwxrwxr-x 8 sam1 sam1 4096 May 15 02:01 .git
drwxrwxr-x 8 sam1 sam1 4096 May 16 16:03 ignorecase
```

sam1@sam1p1 192.168.2.3 ~/pers/test\_proj1/yocto/poky/krogoth2.1/poky [Mon May 16 19:23:58]

\$ source oe-init-build-env

### Shell environment set up for builds. ###

You can now run 'bitbake <target>'

Common targets are:

- core-image-minimal
- core-image-sato
- meta-toolchain
- meta-ide-support

You can also run generated qemu images with a command like 'runqemu qemux86'

### 1.3.3 Possible Solutions:

Post analyzing the Yocto reference documents, we came up with the following approaches to solve the Porting effort of Consul into Yocto.

1.3.3.1 [devtool](#) to generate recipe for Consul with new Source/target Binary.

1.3.3.2 [recipetool](#) to automated creation of Consul new base recipe.

1.3.3.3 [bitbake tool](#) to writing a new Consul recipe from scratch.

Selecting option 1.3.3.1 [devtool](#) out of others, owing to time limitation in delivery deadline, later we may evaluate and benchmark [recipetool](#) and bitbake tool solutions.

1.3.4 Between new Development Build of Consul using Golang on Host platform and reusing existing Consul 0.6.4 public binary, we found reusing existing target platform binary is optimised with respect to time and effort required for this quick delivery, hence we selected to reuse existing latest and stable 0.6.4 Consul [Linux 32bit i386](#) [[https://releases.hashicorp.com/consul/0.6.4/consul\\_0.6.4\\_linux\\_386.zip](https://releases.hashicorp.com/consul/0.6.4/consul_0.6.4_linux_386.zip)] binary form [Consul official site](#).

1.3.5 Based on the above selections, we run the following commands:

#### 1.3.5.1 Using devtool to generate recipe for Consul i386 binary from poky workspace:

```
$ devtool add consul064386binv1 --no-git --binary --version 0.6.4
https://releases.hashicorp.com/consul/0.6.4/consul_0.6.4_linux_386.zip
NOTE: Using default source tree path
/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase/workspace/sources/consul064386binv1
NOTE: Using source tree as build directory since that would be the default for this recipe
NOTE: Recipe
/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase/workspace/recipes/consul064386binv1/
consul064386binv1_0.6.4.bb has been automatically created; further editing may be required to make it fully
functional
```

#### 1.3.5.2 Verified the devtool generated Consul recipe contents: *consul064386binv1\_0.6.4.bb :*

```
$cat
~/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase/workspace/recipes/consul064386binv1/consul0643
86binv1_0.6.4.bb
# Recipe created by recipetool
# This is the basis of a recipe and may need further editing in order to be fully functional.
# (Feel free to remove these comments when editing.)
#
# Unable to find any files that looked like license statements. Check the accompanying
# documentation and source headers and set LICENSE and LIC_FILES_CHKSUM accordingly.
```

```
#
# NOTE: LICENSE is being set to "CLOSED" to allow you to at least start building - if
# this is not accurate with respect to the licensing of the software being built (it
# will not be in most cases) you must specify the correct value before using this
# recipe for anything other than initial testing/development!
LICENSE = "CLOSED"
LIC_FILES_CHKSUM = ""

SRC_URI
"https://releases.hashicorp.com/consul/${PV}/consul_${PV}_linux_386.zip;subdir=consul_${PV}_linux_386" =
SRC_URI[md5sum] = "03e9e878fd33d0d365b23fa5342b626c"
SRC_URI[sha256sum] = "dbaf5ad1c95aa7dce1625d61b6686d3775e53cb3e7d6c426d29ea96622d248a8"

S = "${WORKDIR}/consul_${PV}_linux_386"

inherit bin_package

INSANE_SKIP_${PN} += "already-stripped"
```

### 1.3.5.3 Build new Recipe or rebuild the existing qemux86 default Image

Using devtool, we build new Recipe `consul064386binv1` :

```
$ devtool build consul064386binv1
WARNING:
/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase/workspace/recipes/consulp3srcv1.1/co
nsulp3srcv1.1_git.bb: consulp3srcv1.1: LICENSE value "Unknown MIT" has an invalid format - license names
must be separated by the following characters to indicate the license selection: &|()
Parsing recipes: 100%
|#####|
##### | Time: 00:00:41
Parsing of 873 .bb files complete (0 cached, 873 parsed). 1303 targets, 47 skipped, 0 masked, 0 errors.
NOTE: Resolving any missing task queue dependencies
```

```
Build Configuration:
BB_VERSION      = "1.30.0"
BUILD_SYS       = "x86_64-linux"
NATIVELSBSTRING = "universal"
TARGET_SYS      = "i586-poky-linux"
MACHINE         = "qemux86"
DISTRO          = "poky"
DISTRO_VERSION  = "2.1"
TUNE_FEATURES   = "m32 i586"
TARGET_FPU      = ""
meta
meta-poky
meta-yocto-bsp
workspace      = "krogoth:75ca53211488a3e268037a44ee2a7ac5c7181bd2"
```

```
NOTE: Preparing RunQueue
NOTE: Executing SetScene Tasks
NOTE: Executing RunQueue Tasks
NOTE: Tasks Summary: Attempted 333 tasks of which 327 didn't need to be rerun and all succeeded.
```

Summary: There was 1 WARNING message shown.

### 1.3.5.4 Turn on the existing default image qemu86

It was build earlier using bitbake core-image-sato from poky git source. Screenshot added when qemu86 running live from default poky 2.1 image.

```
$ runqemu qemu86
```

Continuing with the following parameters:

KERNEL:

`[/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase/tmp/deploy/images/qemu86/bzImage-qemu86.bin]`

ROOTFS:

`[/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase/tmp/deploy/images/qemu86/core-image-sato-qemu86-20160514163233.rootfs.ext4]`

FSTYPE: `[ext4]`

Setting up tap interface under sudo

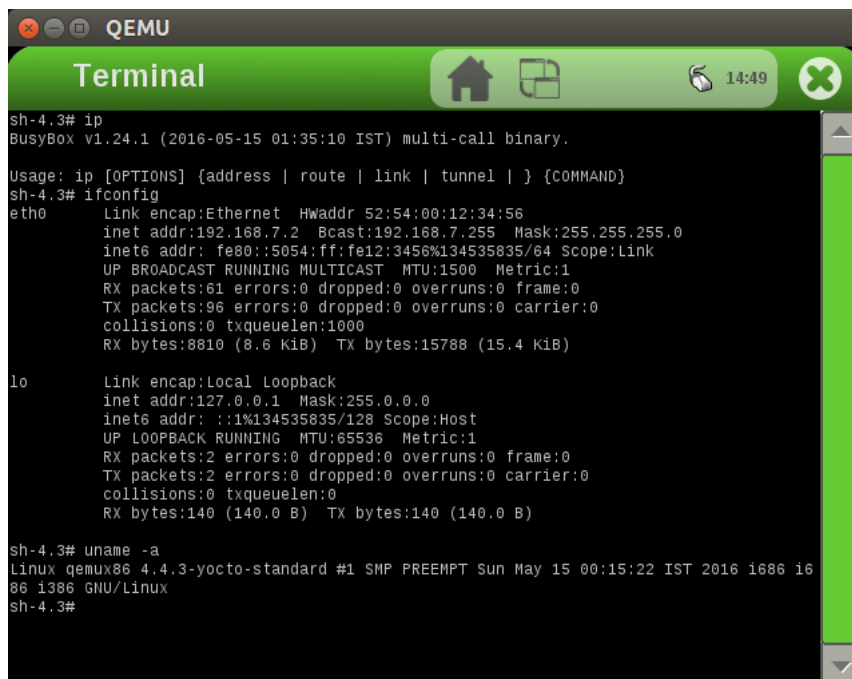
Acquiring lockfile for tap0...

Running qemu-system-i386...

`/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase/tmp/sysroots/x86_64-linux/usr/bin/qemu-system-i386`

-kernel

`/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase/tmp/deploy/images/qemu86/bzImage-qemu86.bin -net nic,model=virtio -net tap,vlan=0,ifname=tap0,script=no,downscript=no -cpu qemu32 -drive file=/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase/tmp/deploy/images/qemu86/core-image-sato-qemu86-20160514163233.rootfs.ext4,if=virtio,format=raw -show-cursor -usb -usbdevice tablet -vga vmware -no-reboot -m 256 -serial mon:vc -serial null -append "vga=0 uvesafb.mode_option=640x480-32 root=/dev/vda rw mem=256M ip=192.168.7.2::192.168.7.1:255.255.255.0 oprofile.timer=1 rootfstype=ext4 "`



```
QEMU
Terminal
sh-4.3# ip
BusyBox v1.24.1 (2016-05-15 01:35:10 IST) multi-call binary.

Usage: ip [OPTIONS] {address | route | link | tunnel | } {COMMAND}
sh-4.3# ifconfig
eth0      Link encap:Ethernet  HWaddr 52:54:00:12:34:56
          inet addr:192.168.7.2  Bcast:192.168.7.255  Mask:255.255.0
          inet6 addr: fe80::5054:ff:fe12:3456%134535835/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:61 errors:0 dropped:0 overruns:0 frame:0
          TX packets:96 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:8810 (8.6 KiB)  TX bytes:15788 (15.4 KiB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1%134535835/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:2 errors:0 dropped:0 overruns:0 frame:0
          TX packets:2 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:140 (140.0 B)  TX bytes:140 (140.0 B)

sh-4.3# uname -a
Linux qemu86 4.4.3-yocto-standard #1 SMP PREEMPT Sun May 15 00:15:22 IST 2016 i686 i686 GNU/Linux
sh-4.3#
```

### 1.3.5.5 Deployed newly build consul064386binv1 recipe into directly to the running target qemu86 emulation

Qemu was running as guest with [root@192.168.7.2](#) by using the devtool deploy-target command as screenshots inline. Once *consul064386binv1* recipe deployed correctly on the running target, then we can see consul binary is newly deployed target under / partition. Then we granted necessary permissions to the *consul* binary and then *consul* started running it as detailed screenshots inline:

```
$ devtool deploy-target consul064386binv1 root@192.168.7.2
```

Parsing recipes..WARNING: consulp3srcv1.1: LICENSE value "Unknown MIT" has an invalid format - license names must be separated by the following characters to indicate the license selection: &|()  
done.

The authenticity of host '192.168.7.2 (192.168.7.2)' can't be established.

RSA key fingerprint is b4:f3:33:1c:a8:e6:26:36:43:0d:1c:8f:87:29:36:81.

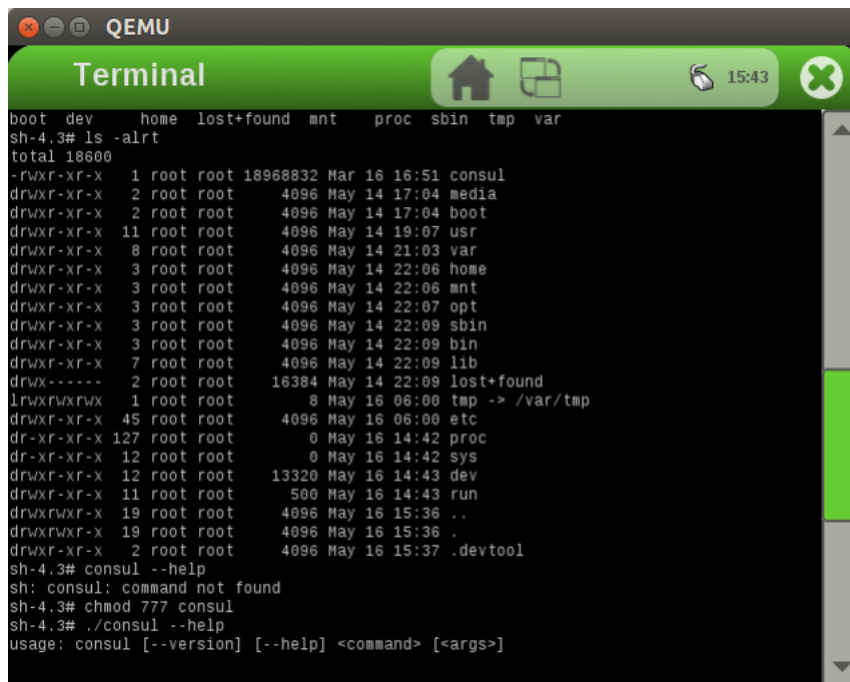
Are you sure you want to continue connecting (yes/no)? yes

NOTE: Successfully

deployed

/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/ignorecase/tmp/work/i586-poky-linux/consul064386binv1/0.6.4-r0/image

Consul newly loaded into qemu86 target :



```
QEMU
Terminal
15:43
boot dev home lost+found mnt proc sbin tmp var
sh-4.3# ls -alrt
total 18600
-rwxr-xr-x 1 root root 18968832 Mar 16 16:51 consul
drwxr-xr-x 2 root root 4096 May 14 17:04 media
drwxr-xr-x 2 root root 4096 May 14 17:04 boot
drwxr-xr-x 11 root root 4096 May 14 19:07 usr
drwxr-xr-x 8 root root 4096 May 14 21:03 var
drwxr-xr-x 3 root root 4096 May 14 22:06 home
drwxr-xr-x 3 root root 4096 May 14 22:06 mnt
drwxr-xr-x 3 root root 4096 May 14 22:07 opt
drwxr-xr-x 3 root root 4096 May 14 22:09 sbin
drwxr-xr-x 3 root root 4096 May 14 22:09 bin
drwxr-xr-x 7 root root 4096 May 14 22:09 lib
drwx----- 2 root root 16384 May 14 22:09 lost+found
lrwxrwxrwx 1 root root 8 May 16 06:00 tmp -> /var/tmp
drwxr-xr-x 45 root root 4096 May 16 06:00 etc
dr-xr-xr-x 127 root root 0 May 16 14:42 proc
dr-xr-xr-x 12 root root 0 May 16 14:42 sys
drwxr-xr-x 12 root root 13320 May 16 14:43 dev
drwxr-xr-x 11 root root 500 May 16 14:43 run
drwxrwxr-x 19 root root 4096 May 16 15:36 ..
drwxrwxr-x 19 root root 4096 May 16 15:36 .
drwxr-xr-x 2 root root 4096 May 16 15:37 .devtool
sh-4.3# consul --help
sh: consul: command not found
sh-4.3# chmod 777 consul
sh-4.3# ./consul --help
usage: consul [--version] [--help] <command> [<args>]
```

Verified Consul binary i386 image into the target by running it as agent mode into the deployments as inline :

```
QEMU
Terminal
sh-4.3# consul --help
sh: consul: command not found
sh-4.3# chmod 777 consul
sh-4.3# ./consul --help
usage: consul [--version] [--help] <command> [<args>]

Available commands are:
agent          Runs a Consul agent
configtest     Validate config file
event          Fire a new event
exec           Executes a command on Consul nodes
force-leave    Forces a member of the cluster to enter the "left" state
info           Provides debugging information for operators
join           Tell Consul agent to join cluster
keygen         Generates a new encryption key
keyring        Manages gossip layer encryption keys
leave          Gracefully leaves the Consul cluster and shuts down
lock           Execute a command holding a lock
maint          Controls node or service maintenance mode
members        Lists the members of a Consul cluster
monitor        Stream logs from a Consul agent
reload         Triggers the agent to reload configuration files
rtt            Estimates network round trip time between nodes
version        Prints the Consul version
watch          Watch for changes in Consul

sh-4.3# ./consul --version
Consul v0.6.4
Consul Protocol: 3 (Understands back to: 1)
sh-4.3#
```

```
QEMU
Terminal
-protocol=N      Sets the protocol version. Defaults to latest.
-rejoin          Ignores a previous leave and attempts to rejoin the cluster

-server          Switches agent to server mode.
-syslog          Enables logging to syslog
-ui             Enables the built-in static web UI server
-ui-dir=path     Path to directory containing the Web UI resources
-pid-file=path   Path to file to store agent PID

sh-4.3# ./consul agent
==> Must specify data directory using -data-dir
sh-4.3# ./consul agent -data-dir=/consul_data
==> Starting Consul agent...
==> Starting Consul agent RPC...
==> Consul agent running!
    Node name: 'qemux86'
    Datacenter: 'dc1'
    Server: false (bootstrap: false)
    Client Addr: 127.0.0.1 (HTTP: 8500, HTTPS: -1, DNS: 8600, RPC: 8400)
    Cluster Addr: 192.168.7.2 (LAN: 8301, WAN: 8302)
    Gossip encrypt: false, RPC-TLS: false, TLS-Incoming: false
    Atlas: <disabled>

==> Log data will now stream in as it occurs:

2016/05/16 15:52:53 [INFO] serf: EventMemberJoin: qemux86 192.168.7.2
2016/05/16 15:52:53 [ERR] agent: failed to sync remote state: No known Consul serv
ers
2016/05/16 15:53:22 [ERR] agent: failed to sync remote state: No known Consul serv
ers
```

*Reference full screenshot while running consul inside qemux86 default target root@192.168.7.2 in Development Host(aka sam1@sam1) Ubuntu LTS 14.04 x64:*



```

devtool1 x devtool2 x receiptool x QEMU
--also-native installed verbatim (no compilation, same direct
                structure). Useful with binary packages e.g. RP
                Also add native variant (i.e. support building
                for the build host as well as the target machin
                Specify subdirectory within source tree to use
saml@sampl 192.168.2.3 ~/pers/test_proj1/yocto/poky/krogoth2.1/poky/ig
$ cd ..
saml@sampl 192.168.2.3 ~/pers/test_proj1/yocto/poky/krogoth2.1/poky [M
$ source oe-init-build-env

## Shell environment set up for builds. ##

You can now run 'bitbake <target>'

Common targets are:
core-image-minimal
core-image-sato
meta-toolchain
meta-ide-support

You can also run generated qemu images with a command like 'runqemu qem
saml@sampl 192.168.2.3 ~/pers/test_proj1/yocto/poky/krogoth2.1/poky/ig
$ sudo aptitude install git-daemon^Cn git-daemon-sysvinit git-doc git
saml@sampl 192.168.2.3 ~/pers/test_proj1/yocto/poky/krogoth2.1/poky/ig
$ ^C
saml@sampl 192.168.2.3 ~/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase [Mon May 16 20:12:35]
$ runqemu qemu86

Continuing with the following parameters:
KERNEL: [/home/saml/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase/tmp/deploy/images/qemu86/bzImage-qemu86.bin]
ROOTFS: [/home/saml/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase/tmp/deploy/images/qemu86/core-image-sato-qemu86-20160514163233.rootfs.ext4]
FSTYPE: [ext4]
Setting up tap interface under sudo
Acquiring lockfile for tap0...
Running qemu-system-i386...
/home/saml/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase/tmp/sysroots/x86_64-linux/usr/bin/qemu-system-i386 -kernel /home/saml/pers/test_proj1/yocto/poky/krogo
th2.1/poky/ignorecase/tmp/deploy/images/qemu86/bzImage-qemu86.bin -net nic,model=virtio -net tap,vlan=0,ifname=tap0,script=no,downscript=no -cpu qemu32 -drive file=/
home/saml/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase/tmp/deploy/images/qemu86/core-image-sato-qemu86-20160514163233.rootfs.ext4,if=virtio,format=raw -show
-cursor -usb -usbdevice tablet -vga vmware -no-reboot -m 256 -serial mon:vc -serial null -append "vga=0 uvcsafb.mode_option=640x480-32 root=/dev/vda rw mem=256M ip=192
.168.7.2::192.168.7.1:255.255.255.0 oprofile.timer=1 rootfstype=ext4 "
main-loop: WARNING: I/O thread spun for 1000 iterations

```

### 1.3.5.6 Data Integrity with new consul recipe contents:

#### 1.3.5.6.1 Workspace tree structure:

```

$ tree conf workspace/conf workspace/appends workspace/recipes/consul064386binv1
workspace/sources/consul064386binv1
conf
|-- bblayers.conf
|-- local.conf
|-- templateconf.cfg
`-- unlocked-sigs.inc
workspace/conf
`-- layer.conf
workspace/appends
|-- consul064386binv1_0.6.4.bbappend
`-- consulp3srcv1.1_git.bbappend
workspace/recipes/consul064386binv1
`-- consul064386binv1_0.6.4.bb
workspace/sources/consul064386binv1
`-- consul

```

0 directories, 9 files

### 1.3.5.6.2 consul binary:

```
$ ls -alrt workspace/sources/consul064386binv1/consul
-rwxr-xr-x 1 sam1 sam1 18968832 Mar 16 22:21 workspace/sources/consul064386binv1/consul
sam1@sam1p1 192.168.2.3 ~/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase [Mon May 16 21:53:56]
```

```
$ workspace/sources/consul064386binv1/consul --version
Consul v0.6.4
Consul Protocol: 3 (Understands back to: 1)
```

### 1.3.5.6.3 consul new recipe contents:

consul064386binv1\_0.6.4.bb:

```
$ cat workspace/recipes/consul064386binv1/consul064386binv1_0.6.4.bb
# Recipe created by recipetool
# This is the basis of a recipe and may need further editing in order to be fully functional.
# (Feel free to remove these comments when editing.)
#
# Unable to find any files that looked like license statements. Check the accompanying
# documentation and source headers and set LICENSE and LIC_FILES_CHKSUM accordingly.
#
# NOTE: LICENSE is being set to "CLOSED" to allow you to at least start building - if
# this is not accurate with respect to the licensing of the software being built (it
# will not be in most cases) you must specify the correct value before using this
# recipe for anything other than initial testing/development!
LICENSE = "CLOSED"
LIC_FILES_CHKSUM = ""

SRC_URI =
"https://releases.hashicorp.com/consul/${PV}/consul_${PV}_linux_386.zip;subdir=consul_${PV}_linux_386"
SRC_URI[md5sum] = "03e9e878fd33d0d365b23fa5342b626c"
SRC_URI[sha256sum] = "dbaf5ad1c95aa7dce1625d61b6686d3775e53cb3e7d6c426d29ea96622d248a8"

S = "${WORKDIR}/consul_${PV}_linux_386"

inherit bin_package

INSANE_SKIP_${PN} += "already-stripped"

sam1@sam1p1 192.168.2.3 ~/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase [Tue May 17 4:40:02]

consul064386binv1_0.6.4.bbappend:

$ cat workspace/append/consul064386binv1_0.6.4.bbappend
inherit externalsrc
EXTERNALSRC =
"/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase/workspace/sources/consul064386binv
1"
EXTERNALSRC_BUILD =
"/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase/workspace/sources/consul064386binv
1"
do_install_append() {
```

```
rm -rf ${D}/.git
rm -f ${D}/singletask.lock
}
sam1@samlp1 192.168.2.3 ~/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase [Tue May 17 4:40:32]
```

#### 1.3.5.6.4 Default workspace layer contents:

```
$ cat workspace/conf/layer.conf
# ### workspace layer auto-generated by devtool ###
BBPATH = "${LAYERDIR}:"
BBFILES += "${LAYERDIR}/recipes/*/.*.bb \
    ${LAYERDIR}/append/*.*bbappend"
BBFILE_COLLECTIONS += "workspacelayer"
BBFILE_PATTERN_workspacelayer = "^${LAYERDIR}/"
BBFILE_PATTERN_IGNORE_EMPTY_workspacelayer = "1"
BBFILE_PRIORITY_workspacelayer = "99"
sam1@samlp1 192.168.2.3 ~/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase [Tue May 17 4:40:47]
```

---

## Problem 2:

How to create or extend any Yocto configuration for QEMU.

## Solution of Problem 2:

### 2.1 Yocto BSP SDK tools can be leveraged for qemu:

We choose qemux86 for better library compatible BSP as jgqemux86v1 configuration as inline:

### 2.2 Source the environment in order to create or build a BSP:

*\$ source oe-init-build-env*  
*You had no conf/local.conf file. This configuration file has therefore been created for you with some default values. You may wish to edit it to, for example, select a different MACHINE (target hardware). See conf/local.conf for more information as common configuration options are commented.*

*You had no conf/bblayers.conf file. This configuration file has therefore been created for you with some default values. To add additional metadata layers into your configuration please add entries to conf/bblayers.conf.*

*The Yocto Project has extensive documentation about OE including a reference*

manual which can be found at:  
<http://yoctoproject.org/documentation>

For more information about OpenEmbedded see their website:  
<http://www.openembedded.org/>

### Shell environment set up for builds. ###

You can now run 'bitbake <target>'

Common targets are:  
core-image-minimal  
core-image-sato  
meta-toolchain  
meta-ide-support

You can also run generated qemu images with a command like 'runqemu qemu86'

## 2.3 Calling new target machine 'jgqemux86v1' and will invoke 'yocto-bsp create'

This will create our BSP layer in meta-jgqemux86v1 in the current directory with the inline options:

```
$ yocto-bsp create jgqemux86v1 qemu
Checking basic git connectivity...
Done.
```

Which qemu architecture would you like to use? [default: i386]

- 1) i386 (32-bit)
- 2) x86\_64 (64-bit)
- 3) ARM (32-bit)
- 4) PowerPC (32-bit)
- 5) MIPS (32-bit)
- 6) MIPS64 (64-bit)

1

Would you like to use the default (4.4) kernel? (y/n) [default: y]

Do you need a new machine branch for this BSP (the alternative is to re-use an existing branch)? [y/n] [default: y] n

Getting branches from remote repo [git://git.yoctoproject.org/linux-yocto-4.4.git...](http://git.yoctoproject.org/linux-yocto-4.4.git...)

Please choose a machine branch to base this BSP on: [default: standard/base]

- 1) standard/arm-versatile-926ejs
- 2) standard/base
- 3) standard/beaglebone
- 4) standard/edgerouter
- 5) standard/fsl-mpc8315e-rdb
- 6) standard/mti-malta32
- 7) standard/mti-malta64
- 8) standard/preempt-rt
- 9) standard/qemuarm64
- 10) standard/qemuppc

Would you like SMP support? (y/n) [default: y]  
Does your BSP have a touchscreen? (y/n) [default: n]  
Does your BSP have a keyboard? (y/n) [default: y]

New qemu BSP created in meta-jgqemux86v1

sam1@sam1p1 192.168.2.3 ~/pers/test\_proj1/yocto/poky/krogoth2.1/poky/ignorecase [Mon May 16 23:41:29]

```
$ ls -al
total 2280
drwxrwxr-x 10 sam1 sam1 4096 May 16 23:38 .
drwxrwxr-x 13 sam1 sam1 4096 May 14 21:51 ..
-rw-rw-r-- 1 sam1 sam1 0 May 16 23:38 bitbake.lock
drwxrwxr-x 2 sam1 sam1 4096 May 16 23:38 cache
drwxrwxr-x 2 sam1 sam1 4096 May 16 12:41 conf
drwxrwxr-x 4 sam1 sam1 49152 May 16 22:24 downloads
drwxrwxr-x 2 sam1 sam1 4096 May 16 23:32 meta-jgqemui386
drwxrwxr-x 8 sam1 sam1 4096 May 16 23:41 meta-jgqemux86v1
-rw-rw-r-- 1 sam1 sam1 2234083 May 15 03:44 output12
-rw-rw-r-- 1 sam1 sam1 2498 May 16 23:25 output13
drwxrwxr-x 259 sam1 sam1 4096 May 14 23:57 sstate-cache
drwxrwxr-x 12 sam1 sam1 4096 May 15 02:32 tmp
drwxrwxr-x 6 sam1 sam1 4096 May 16 12:43 workspace
```

## 2.4 Add the new Consul BSP layer to BBLAYERS

In the BBLAYERS, in *ignorecase/conf/bblayers.conf*, to build or use the other Yocto BSP tools :

```
$ cat ignorecase/conf/bblayers.conf
# POKY_BBLAYERS_CONF_VERSION is increased each time build/conf/bblayers.conf
# changes incompatibly
POKY_BBLAYERS_CONF_VERSION = "2"

BBPATH = "${TOPDIR}"
BBFILES ?= ""

BBLAYERS ?= " \
/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/meta \
/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/meta-poky \
/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/meta-yocto-bsp \
/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase/workspace \
/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase/meta-jgqemux86v1 \
"
```

## 2.5 Inline modified layer configuration: conf/local.conf :

The modified lines are marked as highlighted and bold inline:

```
MACHINE ??= "jgqemux86v1"  
PACKAGE_CLASSES ?= "package_deb"  
EXTRA_IMAGE_FEATURES ?= "debug-tweaks"  
IMAGE_INSTALL_append = " consul064386binv1"
```

```
sam1@sam1p1 192.168.2.3 ~/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase [Tue May 17 0:04:23]
```

```
$ cat conf/local.conf
```

```
#  
# This file is your local configuration file and is where all local user settings  
# are placed. The comments in this file give some guide to the options a new user  
# to the system might want to change but pretty much any configuration option can  
# be set in this file. More adventurous users can look at local.conf.extended  
# which contains other examples of configuration which can be placed in this file  
# but new users likely won't need any of them initially.  
#  
# Lines starting with the '#' character are commented out and in some cases the  
# default values are provided as comments to show people example syntax. Enabling  
# the option is a question of removing the # character and making any change to the  
# variable as required.
```

```
#  
# Machine Selection  
#  
# You need to select a specific machine to target the build with. There are a selection  
# of emulated machines available which can boot and run in the QEMU emulator:
```

```
#  
#MACHINE ?= "qemuarm"  
#MACHINE ?= "qemuarm64"  
#MACHINE ?= "qemumips"  
#MACHINE ?= "qemumips64"  
#MACHINE ?= "qemuppc"  
#MACHINE ?= "qemux86"  
#MACHINE ?= "qemux86-64"
```

```
#  
# There are also the following hardware board target machines included for  
# demonstration purposes:
```

```
#  
#MACHINE ?= "beaglebone"  
#MACHINE ?= "genericx86"  
#MACHINE ?= "genericx86-64"  
#MACHINE ?= "mpc8315e-rdb"  
#MACHINE ?= "edgerouter"
```

```
#  
# This sets the default machine to be qemux86 if no other machine is selected:  
#default
```

```
#MACHINE ??= "qemux86"  
#for custom qemu build  
MACHINE ??= "jgqemux86v1"
```

```
#
```

```

# Where to place downloads
#
# During a first build the system will download many different source code tarballs
# from various upstream projects. This can take a while, particularly if your network
# connection is slow. These are all stored in DL_DIR. When wiping and rebuilding you
# can preserve this directory to speed up this part of subsequent builds. This directory
# is safe to share between multiple builds on the same machine too.
#
# The default is a downloads directory under TOPDIR which is the build directory.
#
#DL_DIR ?= "${TOPDIR}/downloads"

#
# Where to place shared-state files
#
# BitBake has the capability to accelerate builds based on previously built output.
# This is done using "shared state" files which can be thought of as cache objects
# and this option determines where those files are placed.
#
# You can wipe out TMPDIR leaving this directory intact and the build would regenerate
# from these files if no changes were made to the configuration. If changes were made
# to the configuration, only shared state files where the state was still valid would
# be used (done using checksums).
#
# The default is a sstate-cache directory under TOPDIR.
#
#SSTATE_DIR ?= "${TOPDIR}/sstate-cache"

#
# Where to place the build output
#
# This option specifies where the bulk of the building work should be done and
# where BitBake should place its temporary files and output. Keep in mind that
# this includes the extraction and compilation of many applications and the toolchain
# which can use Gigabytes of hard disk space.
#
# The default is a tmp directory under TOPDIR.
#
#TMPDIR = "${TOPDIR}/tmp"

#
# Default policy config
#
# The distribution setting controls which policy settings are used as defaults.
# The default value is fine for general Yocto project use, at least initially.
# Ultimately when creating custom policy, people will likely end up subclassing
# these defaults.
#
#DISTRO ?= "poky"
# As an example of a subclass there is a "bleeding" edge policy configuration
# where many versions are set to the absolute latest code from the upstream
# source control systems. This is just mentioned here as an example, its not
# useful to most new users.
# DISTRO ?= "poky-bleeding"

#
# Package Management configuration
#

```

```

# This variable lists which packaging formats to enable. Multiple package backends
# can be enabled at once and the first item listed in the variable will be used
# to generate the root filesystems.
# Options are:
# - 'package_deb' for debian style deb files
# - 'package_ipk' for ipk files are used by opkg (a debian style embedded package manager)
# - 'package_rpm' for rpm style packages
# E.g.: PACKAGE_CLASSES ?= "package_rpm package_deb package_ipk"
# We default to rpm:
#PACKAGE_CLASSES ?= "package_rpm package_deb package_ipk"
PACKAGE_CLASSES ?= "package_deb"

#
# SDK target architecture
#
# This variable specifies the architecture to build SDK items for and means
# you can build the SDK packages for architectures other than the machine you are
# running the build on (i.e. building i686 packages on an x86_64 host).
# Supported values are i686 and x86_64
#SDKMACHINE ?= "i686"

#
# Extra image configuration defaults
#
# The EXTRA_IMAGE_FEATURES variable allows extra packages to be added to the generated
# images. Some of these options are added to certain image types automatically. The
# variable can contain the following options:
# "dbg-pkgs" - add -dbg packages for all installed packages
# (adds symbol information for debugging/profiling)
# "dev-pkgs" - add -dev packages for all installed packages
# (useful if you want to develop against libs in the image)
# "ptest-pkgs" - add -ptest packages for all ptest-enabled packages
# (useful if you want to run the package test suites)
# "tools-sdk" - add development tools (gcc, make, pkgconfig etc.)
# "tools-debug" - add debugging tools (gdb, strace)
# "eclipse-debug" - add Eclipse remote debugging support
# "tools-profile" - add profiling tools (oprofile, ltng, valgrind)
# "tools-testapps" - add useful testing tools (ts_print, aplay, arecord etc.)
# "debug-tweaks" - make an image suitable for development
# e.g. ssh root access has a blank password
# There are other application targets that can be used here too, see
# meta/classes/image.bbclass and meta/classes/core-image.bbclass for more details.
# We default to enabling the debugging tweaks.
EXTRA_IMAGE_FEATURES ?= "debug-tweaks"

#
# Additional image features
#
# The following is a list of additional classes to use when building images which
# enable extra features. Some available options which can be included in this variable
# are:
# - 'buildstats' collect build statistics
# - 'image-mklibs' to reduce shared library files size for an image
# - 'image-prelink' in order to prelink the filesystem image
# - 'image-swab' to perform host system intrusion detection
# NOTE: if listing mklibs & prelink both, then make sure mklibs is before prelink
# NOTE: mklibs also needs to be explicitly enabled for a given image, see local.conf.extended
# image-prelink disabled for now due to issues with IFUNC symbol relocation

```



*USER\_CLASSES ?= "buildstats image-mklibs"*

```
#
# Runtime testing of images
#
# The build system can test booting virtual machine images under qemu (an emulator)
# after any root filesystems are created and run tests against those images. To
# enable this uncomment this line. See classes/testimage(-auto).bbclass for
# further details.
#TEST_IMAGE = "1"
#
# Interactive shell configuration
#
# Under certain circumstances the system may need input from you and to do this it
# can launch an interactive shell. It needs to do this since the build is
# multithreaded and needs to be able to handle the case where more than one parallel
# process may require the user's attention. The default is iterate over the available
# terminal types to find one that works.
#
# Examples of the occasions this may happen are when resolving patches which cannot
# be applied, to use the devshell or the kernel menuconfig
#
# Supported values are auto, gnome, xfce, rxvt, screen, konsole (KDE 3.x only), none
# Note: currently, Konsole support only works for KDE 3.x due to the way
# newer Konsole versions behave
#OE_TERMINAL = "auto"
# By default disable interactive patch resolution (tasks will just fail instead):
PATCHRESOLVE = "noop"

#
# Disk Space Monitoring during the build
#
# Monitor the disk space during the build. If there is less than 1GB of space or less
# than 100K inodes in any key build location (TMPDIR, DL_DIR, SSTATE_DIR), gracefully
# shutdown the build. If there is less than 100MB or 1K inodes, perform a hard abort
# of the build. The reason for this is that running completely out of space can corrupt
# files and damages the build in ways which may not be easily recoverable.
# It's necessary to monitor /tmp, if there is no space left the build will fail
# with very exotic errors.
BB_DISKMON_DIRS = "\
    STOPTASKS,{TMPDIR},1G,100K \
    STOPTASKS,{DL_DIR},1G,100K \
    STOPTASKS,{SSTATE_DIR},1G,100K \
    STOPTASKS,/tmp,100M,100K \
    ABORT,{TMPDIR},100M,1K \
    ABORT,{DL_DIR},100M,1K \
    ABORT,{SSTATE_DIR},100M,1K \
    ABORT,/tmp,10M,1K"

#
# Shared-state files from other locations
#
# As mentioned above, shared state files are prebuilt cache data objects which can
# used to accelerate build time. This variable can be used to configure the system
# to search other mirror locations for these objects before it builds the data itself.
#
# This can be a filesystem directory, or a remote url such as http or ftp. These
# would contain the sstate-cache results from previous builds (possibly from other
```

```
# machines). This variable works like fetcher MIRRORS/PREMIRRORS and points to the
# cache locations to check for the shared objects.
# NOTE: if the mirror uses the same structure as SSTATE_DIR, you need to add PATH
# at the end as shown in the examples below. This will be substituted with the
# correct path within the directory structure.
#SSTATE_MIRRORS ?= "\
#file://.* http://someserver.tld/share/sstate/PATH;downloadfilename=PATH \n \
#file://.* file:///some/local/dir/sstate/PATH"
```

```
#
# Qemu configuration
#
# By default qemu will build with a builtin VNC server where graphical output can be
# seen. The two lines below enable the SDL backend too. By default libSDL-native will
# be built, if you want to use your host's libSDL instead of the minimal libSDL built
# by libSDL-native then uncomment the ASSUME_PROVIDED line below.
PACKAGECONFIG_append_pn-qemu-native = " sdl"
PACKAGECONFIG_append_pn-nativesdk-qemu = " sdl"
#ASSUME_PROVIDED += "libSDL-native"
```

```
# CONF_VERSION is increased each time build/conf/ changes incompatibly and is used to
# track the version of this file when it was generated. This can safely be ignored if
# this doesn't mean anything to you.
CONF_VERSION = "1"
INHERIT += "rm_work"
IMAGE_INSTALL_append = " consul064386binv1"
```

## 2.5 Using meta/recipes-sato/images/core-image-sato.bb for new image building:

```
$ cat meta/recipes-sato/images/core-image-sato.bb
DESCRIPTION = "Image with Sato, a mobile environment and visual style for \
mobile devices. The image supports X11 with a Sato theme, Pimlico \
applications, and contains terminal, editor, and file manager."

IMAGE_FEATURES += "splash x11-base x11-sato ssh-server-dropbear hwcodecs"

LICENSE = "MIT"

inherit core-image

IMAGE_INSTALL += "consul064386binv1 packagegroup-core-x11-sato-games"
```

## 2.6 Building the new image jgqemux86v1 with recipe consul064386binv1:

```
$ bitbake core-image-sato 2>&1 | tee output15
Parsing recipes...done.
Parsing of 872 .bb files complete (0 cached, 872 parsed). 1302 targets, 48 skipped, 0 masked, 0 errors.
NOTE: Resolving any missing task queue dependencies

Build Configuration:
BB_VERSION      = "1.30.0"
BUILD_SYS      = "x86_64-linux"
```

```

NATIVESBSTRING = "universal"
TARGET_SYS      = "i586-poky-linux"
MACHINE         = "jqgemux86v1"
DISTRO          = "poky"
DISTRO_VERSION  = "2.1"
TUNE_FEATURES   = "m32 i586"
TARGET_FPU      = ""
meta
meta-poky
meta-yocto-bsp
workspace
meta-jqgemux86v1 = "krogoth:75ca53211488a3e268037a44ee2a7ac5c7181bd2"

```

NOTE: Preparing RunQueue

NOTE: Executing SetScene Tasks

```

NOTE:      Running      setscene      task      1741      of      2054
(/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-kernel/linux/linux-yocto_4.4.bb,
do_package_write_deb_setscene)

```

```

NOTE:      Running      setscene      task      1743      of      2054
(/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-core/packagegroups/packagegroup-
core-boot.bb, do_package_write_deb_setscene)

```

```

NOTE:      Running      setscene      task      1744      of      2054
(/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-core/packagegroups/packagegroup-
base.bb, do_package_write_deb_setscene)

```

```

NOTE:      Running      setscene      task      1745      of      2054
(/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-sato/packagegroups/packagegroup-
core-x11-sato.bb, do_package_write_deb_setscene)

```

NOTE: recipe packagegroup-core-boot-1.0-r17: task do\_package\_write\_deb\_setscene: Started

```

NOTE:      recipe      linux-yocto-4.4.3+gitAUTOINC+d6ee402d46_578ff2a886-r0.1:      task
do_package_write_deb_setscene: Started

```

NOTE: recipe packagegroup-base-1.0-r83: task do\_package\_write\_deb\_setscene: Started

NOTE: recipe packagegroup-core-x11-sato-1.0-r33: task do\_package\_write\_deb\_setscene: Started

NOTE: recipe packagegroup-core-boot-1.0-r17: task do\_package\_write\_deb\_setscene: Succeeded

```

NOTE:      Running      setscene      task      1761      of      2054
(/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-core/base-files/base-files_3.0.14.bb,
do_package_write_deb_setscene)

```

NOTE: recipe packagegroup-core-x11-sato-1.0-r33: task do\_package\_write\_deb\_setscene: Succeeded

NOTE: recipe packagegroup-base-1.0-r83: task do\_package\_write\_deb\_setscene: Succeeded

```

NOTE:      recipe      linux-yocto-4.4.3+gitAUTOINC+d6ee402d46_578ff2a886-r0.1:      task
do_package_write_deb_setscene: Succeeded

```

```

NOTE:      Running      setscene      task      1766      of      2054
(/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-core/busybox/busybox_1.24.1.bb,
do_package_write_deb_setscene)

```

```

NOTE:      Running      setscene      task      1768      of      2054
(/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-core/init-ifupdown/init-
ifupdown_1.0.bb, do_package_write_deb_setscene)

```

```

NOTE:      Running      setscene      task      1788      of      2054
(/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-sato/matchbox-sato/matchbox-
session-sato_0.1.bb, do_package_write_deb_setscene)

```

NOTE: recipe base-files-3.0.14-r89: task do\_package\_write\_deb\_setscene: Started

NOTE: recipe init-ifupdown-1.0-r7: task do\_package\_write\_deb\_setscene: Started

NOTE: recipe matchbox-session-sato-0.1-r30: task do\_package\_write\_deb\_setscene: Started

NOTE: recipe base-files-3.0.14-r89: task do\_package\_write\_deb\_setscene: Succeeded

NOTE: recipe init-ifupdown-1.0-r7: task do\_package\_write\_deb\_setscene: Succeeded

```

NOTE:      Running      setscene      task      1804      of      2054
(/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-multimedia/gstreamer/gst-
player_git.bb, do_package_write_deb_setscene)

```

NOTE: recipe busybox-1.24.1-r0: task do\_package\_write\_deb\_setscene: Started

NOTE: recipe matchbox-session-sato-0.1-r30: task do\_package\_write\_deb\_setscene: Succeeded

NOTE: Running setscene task 1809 of 2054  
 (/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-graphics/packagegroups/packagegroup-core-x11-xserver.bb, do\_package\_write\_deb\_setscene)

NOTE: Running setscene task 1812 of 2054  
 (/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-bsp/pointercal/pointercal\_0.0.bb, do\_package\_write\_deb\_setscene)

NOTE: recipe busybox-1.24.1-r0: task do\_package\_write\_deb\_setscene: Succeeded

NOTE: recipe pointercal-0.0-r11: task do\_package\_write\_deb\_setscene: Started

NOTE: recipe packagegroup-core-x11-xserver-1.0-r40: task do\_package\_write\_deb\_setscene: Started

NOTE: recipe gst-player-git-r0: task do\_package\_write\_deb\_setscene: Started

NOTE: Running setscene task 1872 of 2054  
 (/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-multimedia/gstreamer/gstreamer1.0\_1.6.3.bb, do\_package\_write\_deb\_setscene)

NOTE: recipe pointercal-0.0-r11: task do\_package\_write\_deb\_setscene: Succeeded

NOTE: recipe packagegroup-core-x11-xserver-1.0-r40: task do\_package\_write\_deb\_setscene: Succeeded

NOTE: Running setscene task 1875 of 2054  
 (/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-multimedia/gstreamer/gstreamer1.0-plugins-base\_1.6.3.bb, do\_package\_write\_deb\_setscene)

NOTE: recipe gst-player-git-r0: task do\_package\_write\_deb\_setscene: Succeeded

NOTE: Running setscene task 1885 of 2054  
 (/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-core/sysvinit/sysvinit-inittab\_2.88dsf.bb, do\_package\_write\_deb\_setscene)

NOTE: Running setscene task 1890 of 2054  
 (/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-bsp/formfactor/formfactor\_0.0.bb, do\_package\_write\_deb\_setscene)

NOTE: recipe gstreamer1.0-1.6.3-r0: task do\_package\_write\_deb\_setscene: Started

NOTE: recipe sysvinit-inittab-2.88dsf-r10: task do\_package\_write\_deb\_setscene: Started

NOTE: recipe gstreamer1.0-plugins-base-1.6.3-r0: task do\_package\_write\_deb\_setscene: Started

NOTE: recipe formfactor-0.0-r45: task do\_package\_write\_deb\_setscene: Started

NOTE: recipe sysvinit-inittab-2.88dsf-r10: task do\_package\_write\_deb\_setscene: Succeeded

NOTE: recipe gstreamer1.0-1.6.3-r0: task do\_package\_write\_deb\_setscene: Succeeded

NOTE: Running setscene task 1900 of 2054  
 (/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-multimedia/gstreamer/gstreamer1.0-plugins-good\_1.6.3.bb, do\_package\_write\_deb\_setscene)

NOTE: Running setscene task 1901 of 2054  
 (/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-multimedia/gstreamer/gstreamer1.0-plugins-bad\_1.6.3.bb, do\_package\_write\_deb\_setscene)

NOTE: recipe formfactor-0.0-r45: task do\_package\_write\_deb\_setscene: Succeeded

NOTE: Running setscene task 1910 of 2054  
 (/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-graphics/x11-common/xserver-nodm-init.bb, do\_package\_write\_deb\_setscene)

NOTE: recipe gstreamer1.0-plugins-base-1.6.3-r0: task do\_package\_write\_deb\_setscene: Succeeded

NOTE: Running setscene task 1924 of 2054  
 (/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-extended/shadow/shadow-securetty\_4.2.1.bb, do\_package\_write\_deb\_setscene)

NOTE: recipe gstreamer1.0-plugins-bad-1.6.3-r0: task do\_package\_write\_deb\_setscene: Started

NOTE: recipe xserver-nodm-init-1.0-r31: task do\_package\_write\_deb\_setscene: Started

NOTE: recipe gstreamer1.0-plugins-good-1.6.3-r0: task do\_package\_write\_deb\_setscene: Started

NOTE: recipe shadow-securetty-4.2.1-r3: task do\_package\_write\_deb\_setscene: Started

NOTE: recipe xserver-nodm-init-1.0-r31: task do\_package\_write\_deb\_setscene: Succeeded

NOTE: recipe shadow-securetty-4.2.1-r3: task do\_package\_write\_deb\_setscene: Succeeded

NOTE: recipe gstreamer1.0-plugins-good-1.6.3-r0: task do\_package\_write\_deb\_setscene: Succeeded

NOTE: Running setscene task 2022 of 2054  
 (/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-connectivity/connman/connman-conf.bb, do\_package\_write\_deb\_setscene)

NOTE: recipe gstreamer1.0-plugins-bad-1.6.3-r0: task do\_package\_write\_deb\_setscene: Succeeded

NOTE: Running setscene task 2026 of 2054  
(/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-graphics/xorg-xserver/xserver-xf86-config\_0.1.bb, do\_package\_write\_deb\_setscene)

NOTE: recipe xserver-xf86-config-0.1-r33: task do\_package\_write\_deb\_setscene: Started

NOTE: recipe connman-conf-1.0-r2: task do\_package\_write\_deb\_setscene: Started

NOTE: recipe xserver-xf86-config-0.1-r33: task do\_package\_write\_deb\_setscene: Succeeded

NOTE: recipe connman-conf-1.0-r2: task do\_package\_write\_deb\_setscene: Succeeded

NOTE: Executing RunQueue Tasks

NOTE: Running task 5563 of 5657 (ID: 244,  
/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/ignorecase/workspace/recipes/consul064386binv1/consul064386binv1\_0.6.4.bb, do\_packagedata)

NOTE: Running task 5565 of 5657 (ID: 240,  
/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/ignorecase/workspace/recipes/consul064386binv1/consul064386binv1\_0.6.4.bb, do\_populate\_sysroot)

NOTE: recipe consul064386binv1-0.6.4-r0: task do\_packagedata: Started

NOTE: recipe consul064386binv1-0.6.4-r0: task do\_populate\_sysroot: Started

NOTE: recipe consul064386binv1-0.6.4-r0: task do\_packagedata: Succeeded

NOTE: Running task 5646 of 5657 (ID: 249,  
/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/ignorecase/workspace/recipes/consul064386binv1/consul064386binv1\_0.6.4.bb, do\_package\_write\_deb)

NOTE: recipe consul064386binv1-0.6.4-r0: task do\_populate\_sysroot: Succeeded

NOTE: Running task 5647 of 5657 (ID: 245,  
/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/ignorecase/workspace/recipes/consul064386binv1/consul064386binv1\_0.6.4.bb, do\_package\_qa)

NOTE: recipe consul064386binv1-0.6.4-r0: task do\_package\_write\_deb: Started

NOTE: recipe consul064386binv1-0.6.4-r0: task do\_package\_qa: Started

NOTE: recipe consul064386binv1-0.6.4-r0: task do\_package\_qa: Succeeded

NOTE: recipe consul064386binv1-0.6.4-r0: task do\_package\_write\_deb: Succeeded

NOTE: Running task 5648 of 5657 (ID: 9,  
/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-sato/images/core-image-sato.bb, do\_rootfs)

NOTE: Running noexec task 5649 of 5657 (ID: 246,  
/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/ignorecase/workspace/recipes/consul064386binv1/consul064386binv1\_0.6.4.bb, do\_build)

NOTE: Running task 5650 of 5657 (ID: 247,  
/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/ignorecase/workspace/recipes/consul064386binv1/consul064386binv1\_0.6.4.bb, do\_rm\_work)

NOTE: recipe consul064386binv1-0.6.4-r0: task do\_rm\_work: Started

NOTE: recipe consul064386binv1-0.6.4-r0: task do\_rm\_work: Succeeded

NOTE: recipe core-image-sato-1.0-r0: task do\_rootfs: Started

NOTE: recipe core-image-sato-1.0-r0: task do\_rootfs: Succeeded

NOTE: Running task 5651 of 5657 (ID: 8,  
/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-sato/images/core-image-sato.bb, do\_image)

NOTE: recipe core-image-sato-1.0-r0: task do\_image: Started

NOTE: recipe core-image-sato-1.0-r0: task do\_image: Succeeded

NOTE: Running task 5652 of 5657 (ID: 19,  
/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-sato/images/core-image-sato.bb, do\_image\_ext4)

NOTE: Running task 5653 of 5657 (ID: 18,  
/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-sato/images/core-image-sato.bb, do\_image\_tar)

NOTE: recipe core-image-sato-1.0-r0: task do\_image\_ext4: Started

NOTE: recipe core-image-sato-1.0-r0: task do\_image\_tar: Started

NOTE: recipe core-image-sato-1.0-r0: task do\_image\_ext4: Succeeded

NOTE: recipe core-image-sato-1.0-r0: task do\_image\_tar: Succeeded



```

NOTE:      Running      task      5654      of      5657      (ID:      7,
/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-sato/images/core-image-sato.bb,
do_image_complete)
NOTE: recipe core-image-sato-1.0-r0: task do_image_complete: Started
NOTE: recipe core-image-sato-1.0-r0: task do_image_complete: Succeeded
NOTE:      Running      noexec      task      5655      of      5657      (ID:      13,
/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-sato/images/core-image-sato.bb,
do_build)
NOTE:      Running      task      5656      of      5657      (ID:      14,
/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-sato/images/core-image-sato.bb,
do_rm_work)
NOTE: recipe core-image-sato-1.0-r0: task do_rm_work: Started
NOTE: recipe core-image-sato-1.0-r0: task do_rm_work: Succeeded
NOTE:      Running      task      5657      of      5657      (ID:      15,
/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/meta/recipes-sato/images/core-image-sato.bb,
do_rm_work_all)
NOTE: recipe core-image-sato-1.0-r0: task do_rm_work_all: Started
NOTE: recipe core-image-sato-1.0-r0: task do_rm_work_all: Succeeded
NOTE: Tasks Summary: Attempted 5657 tasks of which 5643 didn't need to be rerun and all succeeded.
sam1@sam1p1 192.168.2.3 ~/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase [Tue May 17 3:56:39]
$ locate sanity.conf^C
sam1@sam1p1 192.168.2.3 ~/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase [Tue May 17 3:57:57]
$ ll tmp/deploy/images/jgqemux86v1/bzImage-jgqemux86v1.bin
lrwxrwxrwx 1 sam1 sam1 77 May 17 00:28 tmp/deploy/images/jgqemux86v1/bzImage-jgqemux86v1.bin ->
bzImage--4.4.3+git0+d6ee402d46_578ff2a886-r0.1-jgqemux86v1-20160516183704.bin
sam1@sam1p1 192.168.2.3 ~/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase [Tue May 17 3:57:59]
$ runqemu qemux86 ^C
sam1@sam1p1 192.168.2.3 ~/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase [Tue May 17 3:58:44]

```

## 2.7 Verified the newly build kernel and rootfs image:

```

$ ll tmp/deploy/images/jgqemux86v1/
total 356524
-rw-r--r-- 1 sam1 sam1 4749120 May 17 00:28 bzImage--4.4.3+git0+d6ee402d46_578ff2a886-r0.1-
jgqemux86v1-20160516183704.bin
-rw-rw-r-- 1 sam1 sam1 1661441 May 17 00:28 modules--4.4.3+git0+d6ee402d46_578ff2a886-r0.1-
jgqemux86v1-20160516183704.tgz
drwxrwxr-x 4 sam1 sam1 4096 May 17 00:28 ..
lrwxrwxrwx 1 sam1 sam1 77 May 17 00:28 modules-jgqemux86v1.tgz -> modules--
4.4.3+git0+d6ee402d46_578ff2a886-r0.1-jgqemux86v1-20160516183704.tgz
lrwxrwxrwx 1 sam1 sam1 77 May 17 00:28 bzImage-jgqemux86v1.bin -> bzImage--
4.4.3+git0+d6ee402d46_578ff2a886-r0.1-jgqemux86v1-20160516183704.bin
lrwxrwxrwx 1 sam1 sam1 77 May 17 00:28 bzImage -> bzImage--4.4.3+git0+d6ee402d46_578ff2a886-r0.1-
jgqemux86v1-20160516183704.bin
-rw-r--r-- 1 sam1 sam1 20295 May 17 00:31 core-image-sato-jgqemux86v1-20160516183704.rootfs.manifest
-rw-r--r-- 1 sam1 sam1 43967433 May 17 00:31 core-image-sato-jgqemux86v1-20160516183704.rootfs.tar.bz2
-rw-r--r-- 1 sam1 sam1 180766720 May 17 02:46 core-image-sato-jgqemux86v1-20160516183704.rootfs.ext4
-rw-r--r-- 1 sam1 sam1 294 May 17 03:54 README - _DO_NOT_DELETE_FILES_IN_THIS_DIRECTORY.txt
-rw-r--r-- 1 sam1 sam1 20327 May 17 03:56 core-image-sato-jgqemux86v1-20160516222414.rootfs.manifest
lrwxrwxrwx 1 sam1 sam1 58 May 17 03:56 core-image-sato-jgqemux86v1.manifest -> core-image-sato-
jgqemux86v1-20160516222414.rootfs.manifest
-rw-r--r-- 1 sam1 sam1 47840931 May 17 03:56 core-image-sato-jgqemux86v1-20160516222414.rootfs.tar.bz2
-rw-r--r-- 1 sam1 sam1 196794368 May 17 03:56 core-image-sato-jgqemux86v1-20160516222414.rootfs.ext4
lrwxrwxrwx 1 sam1 sam1 54 May 17 03:56 core-image-sato-jgqemux86v1.ext4 -> core-image-sato-
jgqemux86v1-20160516222414.rootfs.ext4

```

```
lrwxrwxrwx 1 sam1 sam1      57 May 17 03:56 core-image-sato-jgqemux86v1.tar.bz2 -> core-image-sato-
jgqemux86v1-20160516222414.rootfs.tar.bz2
drwxrwxr-x 2 sam1 sam1    4096 May 17 03:56 .
sam1@sam1p1 192.168.2.3 ~/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase [Tue May 17 3:58:48]
```

## 2.8 Tree structure post new image build completion before deployment:

```
$ tree /home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase/meta-jgqemux86v1
/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase/meta-jgqemux86v1
|-- binary
|-- conf
|   |-- layer.conf
|   |-- machine
|   |-- jgqemux86v1.conf
|-- COPYING.MIT
|-- README
|-- README.sources
|-- recipes-bsp
|   |-- formfactor
|       |-- formfactor
|       |-- jgqemux86v1
|       |-- machconfig
|       |-- formfactor_0.0.bbappend
|-- recipes-core
|   |-- init-ifupdown
|       |-- init-ifupdown
|       |-- jgqemux86v1
|       |-- interfaces
|       |-- init-ifupdown_1.0.bbappend
|-- recipes-graphics
|   |-- xorg-xserver
|       |-- xserver-xf86-config
|       |-- jgqemux86v1
|       |-- xorg.conf
|       |-- xserver-xf86-config_0.1.bbappend
|-- recipes-kernel
|   |-- linux
|       |-- files
|       |-- jgqemux86v1.cfg
|       |-- jgqemux86v1-preempt-rt.scc
|       |-- jgqemux86v1.scc
|       |-- jgqemux86v1-standard.scc
|       |-- jgqemux86v1-tiny.scc
|       |-- jgqemux86v1-user-config.cfg
|       |-- jgqemux86v1-user-features.scc
|       |-- jgqemux86v1-user-patches.scc
|       |-- linux-yocto_4.4.bbappend
```

18 directories, 20 files

```
$ tree workspace/recipes/consul064386binv1 workspace/append s workspace/conf
workspace/sources/consul0646binv1
workspace/recipes/consul064386binv1
```

```
`-- consul064386binv1_0.6.4.bb
workspace/append
`-- consul064386binv1_0.6.4.bbappend
workspace/conf
`-- layer.conf
workspace/sources/consul064386binv1
`-- consul
```

0 directories, 4 files

```
$ find * -name jgqemux86v1
ignorecase/tmp/deploy/deb/jgqemux86v1
ignorecase/tmp/deploy/images/jgqemux86v1
ignorecase/tmp/log/cooker/jgqemux86v1
ignorecase/tmp/cache/default-glibc/jgqemux86v1
ignorecase/tmp/work-shared/jgqemux86v1
ignorecase/tmp/work-shared/jgqemux86v1/kernel-source/.kernel-meta/cfg/jgqemux86v1
ignorecase/tmp/sysroots/jgqemux86v1
ignorecase/meta-jgqemux86v1/recipes-graphics/xorg-xserver/xserver-xf86-config/jgqemux86v1
ignorecase/meta-jgqemux86v1/recipes-bsp/formfactor/formfactor/jgqemux86v1
ignorecase/meta-jgqemux86v1/recipes-core/init-ifupdown/init-ifupdown/jgqemux86v1
sam1@sam1p1 192.168.2.3 ~/pers/test_proj1/yocto/poky/krogoth2.1/poky [Tue May 17 2:59:02]
$ find * -name ignorecase/tmp/cache/default-glibc/jgqemux86v1
```

find: warning: Unix filenames usually don't contain slashes (though pathnames do). That means that '-name ignorecase/tmp/cache/default-glibc/jgqemux86v1' will probably evaluate to false all the time on this system. You might find the '-wholename' test more useful, or perhaps '-samefile'. Alternatively, if you are using GNU grep, you could use 'find ... -print0 | grep -FzZ ignorecase/tmp/cache/default-glibc/jgqemux86v1'.

sam1@sam1p1 192.168.2.3 ~/pers/test\_proj1/yocto/poky/krogoth2.1/poky [Tue May 17 3:00:36]

## 2.9 Running the new image jgqemux86v1 with new kernel and rootfs:

```
$ runqemu qemux86 tmp/deploy/images/jgqemux86v1/bzImage-jgqemux86v1.bin
tmp/deploy/images/jgqemux86v1/core-image-sato-jgqemux86v1.ext4
```

Continuing with the following parameters:

KERNEL: [tmp/deploy/images/jgqemux86v1/bzImage-jgqemux86v1.bin]

ROOTFS:

[/home/sam1/pers/test\_proj1/yocto/poky/krogoth2.1/poky/ignorecase/tmp/deploy/images/jgqemux86v1/core-image-sato-jgqemux86v1-20160516183704.rootfs.ext4]

FSTYPE: [ext4]

Setting up tap interface under sudo

Acquiring lockfile for tap0...

Running qemu-system-i386...

```
/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase/tmp/sysroots/x86_64-
linux/usr/bin/qemu-system-i386 -kernel tmp/deploy/images/jgqemux86v1/bzImage-jgqemux86v1.bin -net
nic,model=virtio -net tap,vlan=0,ifname=tap0,script=no,downscript=no -cpu qemu32 -drive
file=/home/sam1/pers/test_proj1/yocto/poky/krogoth2.1/poky/ignorecase/tmp/deploy/images/jgqemux86v1/
core-image-sato-jgqemux86v1-20160516183704.rootfs.ext4,if=virtio,format=raw -show-cursor -usb -usbdevice
tablet -vga vmware -no-reboot -m 256 -serial mon:vc -serial null -append "vga=0
uvesafb.mode_option=640x480-32 root=/dev/vda rw mem=256M ip=192.168.7.2::192.168.7.1:255.255.255.0
oprofile.timer=1 rootfstype=ext4 "
```

...

...



```
QEMU
Terminal
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)

root@jggemux86v1:~# find / -name consul
/consul
root@jggemux86v1:~# /consul --version
Consul v0.6.4
Consul Protocol: 3 (Understands back to: 1)
root@jggemux86v1:~# du -sh /consul
11.7M /consul
root@jggemux86v1:~# /consul agent -data-dir=/tmp
==> Starting Consul agent...
==> Starting Consul agent RPC...
==> Consul agent running!
Node name: 'jggemux86v1'
Datacenter: 'dc1'
Server: false (bootstrap: false)
Client Addr: 127.0.0.1 (HTTP: 8500, HTTPS: -1, DNS: 8600, RPC: 8400)
Cluster Addr: 192.168.7.2 (LAN: 8301, WAN: 8302)
Gossip encrypt: false, RPC-TLS: false, TLS-Incoming: false
Atlas: <disabled>

==> Log data will now stream in as it occurs:

2016/05/16 22:40:02 [INFO] serf: EventMemberJoin: jggemux86v1 192.168.7.2
2016/05/16 22:40:02 [ERR] agent: failed to sync remote state: No known Consul serv
ers

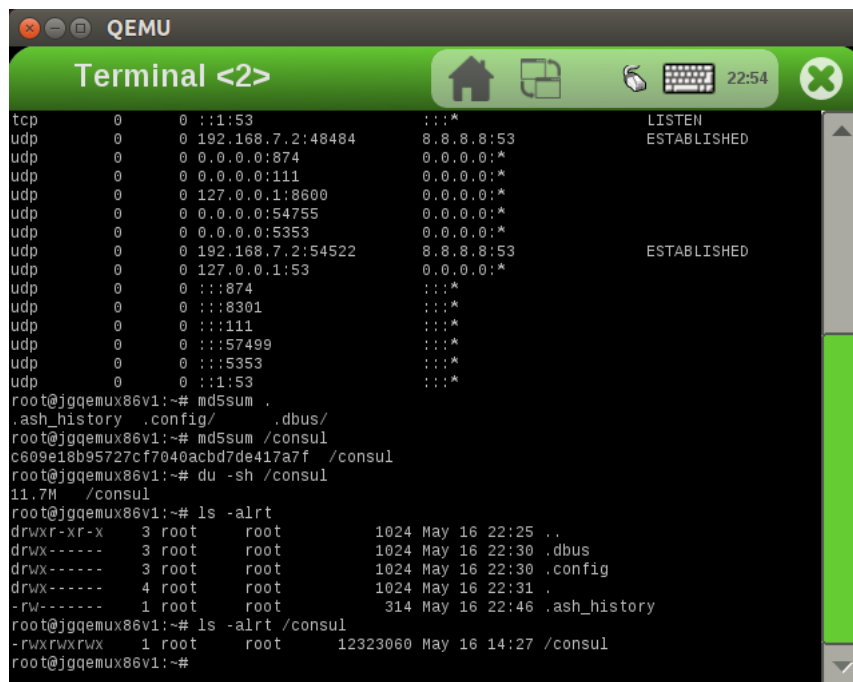
QEMU
Terminal <2>
Usage: netstat [-ral] [-tuwx] [-en]
root@jggemux86v1:~# netstat -unta
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address Foreign Address State
tcp 0 0 0.0.0.0:22 0.0.0.0:* LISTEN
tcp 0 0 127.0.0.1:8600 0.0.0.0:* LISTEN
tcp 0 0 0.0.0.0:111 0.0.0.0:* LISTEN
tcp 0 0 127.0.0.1:8400 0.0.0.0:* LISTEN
tcp 0 0 127.0.0.1:8500 0.0.0.0:* LISTEN
tcp 0 0 127.0.0.1:53 0.0.0.0:* LISTEN
tcp 0 0 :::22 :::* LISTEN
tcp 0 0 :::8301 :::* LISTEN
tcp 0 0 :::111 :::* LISTEN
tcp 0 0 :::1:53 :::* LISTEN
udp 0 0 192.168.7.2:48484 8.8.8.8:53 ESTABLISHED
udp 0 0 0.0.0.0:874 0.0.0.0:*
udp 0 0 0.0.0.0:111 0.0.0.0:*
udp 0 0 127.0.0.1:8600 0.0.0.0:*
udp 0 0 0.0.0.0:54755 0.0.0.0:*
udp 0 0 0.0.0.0:5353 0.0.0.0:*
udp 0 0 192.168.7.2:54522 8.8.8.8:53 ESTABLISHED
udp 0 0 127.0.0.1:53 0.0.0.0:*
udp 0 0 :::874 :::*
udp 0 0 :::8301 :::*
udp 0 0 :::111 :::*
udp 0 0 :::57499 :::*
udp 0 0 :::5353 :::*
udp 0 0 :::1:53 :::*
root@jggemux86v1:~#
```

*Set 'tap0' nonpersistent*  
*Releasing lockfile of preconfigured tap device 'tap0'*

## 2.10 Verified the source consul-i386 source binary and destination target:

jgqemux86v1 binary for integrity and shared the details:

```
$ ll ignorecase/tmp/work/i586-poky-linux/consul064386binv1/0.6.4-r0/package/consul
-rwxr-xr-x  2  sam1  sam1  12323060  May  16  19:57  ignorecase/tmp/work/i586-poky-
linux/consul064386binv1/0.6.4-r0/package/consul
sam1@sam1p1 192.168.2.3 ~/pers/test_proj1/yocto/poky/krogoth2.1/poky [Tue May 17  4:20:38]
$ md5sum ignorecase/tmp/work/i586-poky-linux/consul064386binv1/0.6.4-r0/packages-
split/consul064386binv1/consul
c609e18b95727cf7040acbd7de417a7f ignorecase/tmp/work/i586-poky-linux/consul064386binv1/0.6.4-
r0/packages-split/consul064386binv1/consul
sam1@sam1p1 192.168.2.3 ~/pers/test_proj1/yocto/poky/krogoth2.1/poky [Tue May 17  4:20:43]
$ du -sh ignorecase/tmp/work/i586-poky-linux/consul064386binv1/0.6.4-r0/package/consul
12M ignorecase/tmp/work/i586-poky-linux/consul064386binv1/0.6.4-r0/package/consul
12M total
```



The screenshot shows a QEMU terminal window titled "Terminal <2>". The terminal output displays network connection statistics for TCP and UDP, followed by a series of commands and their outputs. The commands include checking the md5sum of the consul binary, listing the contents of the consul directory, and listing the contents of the /consul directory with permissions and timestamps.

```
tcp      0      0  :::1:53          :::*             LISTEN
udp      0      0  192.168.7.2:48484 8.8.8.8:53      ESTABLISHED
udp      0      0  0.0.0.0:874      0.0.0.0:*
udp      0      0  0.0.0.0:111      0.0.0.0:*
udp      0      0  127.0.0.1:8600    0.0.0.0:*
udp      0      0  0.0.0.0:54755    0.0.0.0:*
udp      0      0  0.0.0.0:5353     0.0.0.0:*
udp      0      0  192.168.7.2:54522 8.8.8.8:53      ESTABLISHED
udp      0      0  127.0.0.1:53     0.0.0.0:*
udp      0      0  :::874           :::*
udp      0      0  :::8301          :::*
udp      0      0  :::111           :::*
udp      0      0  :::57499         :::*
udp      0      0  :::5353          :::*
udp      0      0  :::1:53          :::*
root@jgqemux86v1:~# md5sum .
.ash_history .config/ .dbus/
root@jgqemux86v1:~# md5sum /consul
c609e18b95727cf7040acbd7de417a7f /consul
root@jgqemux86v1:~# du -sh /consul
11.7M /consul
root@jgqemux86v1:~# ls -alrt
drwxr-xr-x  3 root  root    1024 May 16 22:25 ..
drwx-----  3 root  root    1024 May 16 22:30 .dbus
drwx-----  3 root  root    1024 May 16 22:30 .config
drwx-----  4 root  root    1024 May 16 22:31 .
-rw-----  1 root  root    314 May 16 22:46 .ash_history
root@jgqemux86v1:~# ls -alrt /consul
-rwxrwxrwx  1 root  root    12323060 May 16 14:27 /consul
root@jgqemux86v1:~#
```

KINDLY SHARE FEEDBACKS AND SUGGESTIONS OF THE ABOVE CONTENTS.