FATIMA JINNAH WOMEN UNIVERSITY

Submitted To:

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Submitted By:

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Section:

5A

Cloud Computing

LAB11

TASK1

main.tf

```
provider "aws" {
  shared_config_files      = ["~/.aws/config"]
  shared_credentials_files = ["~/.aws/credentials"]
}

```

PROBLEMS OUTPUT TERMINAL PORTS bash

```
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ terraform init

You may now begin working with Terraform. Try running "terraform plan" to see
any changes that are required for your infrastructure. All Terraform commands
should now work.

If you ever set or change modules or backend configuration for Terraform,
rerun this command to reinitialize your working directory. If you forget, other
commands will detect it and remind you to do so if necessary.
@23-22411-027-max ➜/workspaces/LAB11CC (main) $
```

Ln 5, Col 1 Spa

main.tf U

```
# AWS provider
provider "aws" {
  shared_config_files      = ["~/.aws/config"]
  shared_credentials_files = ["~/.aws/credentials"]
}

# Variable for subnet CIDR block
variable "subnet_cidr_block" {
  type    = string
  default = "10.0.0.0/24"   # default value
}

# Output to show variable value
output "subnet_cidr_block_output" {
  value = var.subnet_cidr_block
}
```

```
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ touch terraform.tfvars
nano terraform.tfvars
```

```
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ terraform apply -auto-approve -var "subnet_cidr_
block=10.0.40.0/24"
any real infrastructure.

Apply complete! Resources: 0 added, 0 changed, 0 destroyed.

Outputs:

subnet_cidr_block_output = "10.0.40.0/24"
@23-22411-027-max ➜/workspaces/LAB11CC (main) $
```

0 0 Ln 17, Col 1 Spaces: 2 UTF-8

```
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ printenv | grep TF_VAR_
unset TF_VAR_subnet_cidr_block
printenv | grep TF_V
TF_VAR_subnet_cidr_b
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ export TF_VAR_subnet_cidr_block=10.0.20.0/24
printenv | grep TF_VAR_
TF_VAR_subnet_cidr_block=10.0.20.0/24
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ unset TF_VAR_subnet_cidr_block
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ printenv | grep TF_VAR
```

Focus folder in explorer (ctrl + click)

TASK2

main.tf

```
5   }
6
7   variable "subnet_cidr_block" {
8     type        = string
9     default     = ""
10    description = "CIDR block to assign to the application subnet"
11    sensitive   = false
12    nullable    = false
13    ephemeral   = false
14
15    validation {
16      condition     = can(regex("^([0-9]{1,3}\\.){3}[0-9]{1,3}/[0-9]+$", v
17      error_message = "The subnet_cidr_block must be a valid CIDR notation
18    }
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS                    bash

@23-22411-027-max ➜/workspaces/LAB11CC (main) $ terraform apply -auto-approve -var "subnet_cidr_
block=10.0.0"
    ├─────────────────
    │ var.subnet_cidr_block is "10.0.0"

  The subnet_cidr_block must be a valid CIDR notation string, such as 10.0.0.0/24.

  This was checked by the validation rule at main.tf:15,3-13.

@23-22411-027-max ➜/workspaces/LAB11CC (main) $
```

main.tf

```
19  }
20  variable "api_session_token" {
21    variable "api_session_token" {
22    type        = string
23    default     = ""
24    description = "Short-lived API session token"
25    sensitive   = true
26    nullable    = false
27    ephemeral   = true
28  }
29
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS                    bash

@23-22411-027-max ➜/workspaces/LAB11CC (main) $ terraform apply -auto-approve -var "subnet_cidr
block=10.0.0.0/24"

Apply complete! Resources: 0 added, 0 changed, 0 destroyed.

Outputs:

api_session_token_output = <sensitive>
subnet_cidr_block_output = "10.0.0.0/24"
@23-22411-027-max ➜/workspaces/LAB11CC (main) $
```

0 0 Ln 27, Col 1 Spaces: 2 UTF-8

```
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ cat terraform.tfstate | grep api_session_token_o
utput -A 5
    "api_session_token_output": {
      "value": "my_API_session_Token",
      "type": "string",
      "sensitive": true
    }
  },
@23-22411-027-max ➜/workspaces/LAB11CC (main) $
```

main.tf

```
31  variable "api_session_token" {
32    type        = string
33    default     = "my_API_session_Token"  # <-- Default value set
34    description = "Short-lived API session token used during apply operati
35    sensitive   = true                    # Output will remain masked
36    nullable    = false
37    ephemeral   = false
38
39    validation {
40      condition     = can(regex("^[A-Za-z0-9-_]{20,}$", var.api_session_to
41      error_message = "The API session token must be at least 20 character
42    }
43  }
44
45  output "api_session_token_output" {
46    value     = var.api_session_token
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS bash

```
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ terraform apply -auto-approve -var "subnet_cidr
block=10.0.0.0/24"

Apply complete! Resources: 0 added, 0 changed, 0 destroyed.

Outputs:

api_session_token_output = <sensitive>
subnet_cidr_block_output = "10.0.0.0/24"
@23-22411-027-max ➜/workspaces/LAB11CC (main) $
```

0 0 Ln 27, Col 1 Spaces: 2 UTF-8

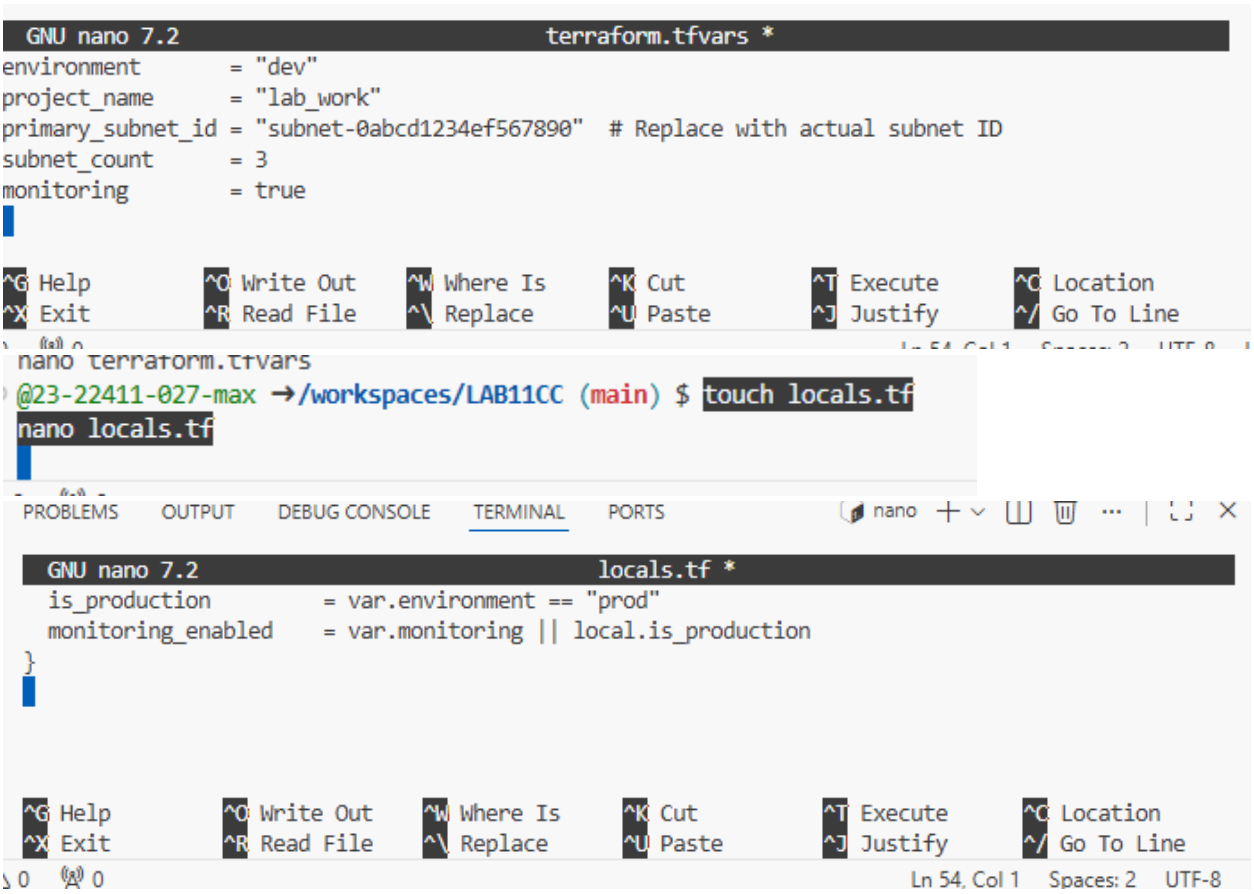
TASK3

main.tf

```
44
45  output "api_session_token_output" {
46    value     = var.api_session_token
47    sensitive = true
48  }
49  variable "environment" {}
50  variable "project_name" {}
51  variable "primary_subnet_id" {}
52  variable "subnet_count" {}
53  variable "monitoring" {}
54
```

```
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ aws ec2 describe-subnets \
  --filters "Name=availability-zone,Values=me-central-1a" \
  --query "Subnets[].SubnetId" \
  --output text
subnet-0af12daab35e04f30        subnet-0a80547ecbb2cf81d        subnet-0b43671a86afa8c1b
@23-22411-027-max ➜/workspaces/LAB11CC (main) $
```

```
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ touch terraform.tfvars
nano terraform.tfvars
```


GNU nano 7.2 terraform.tfvars *
environment = "dev"
project_name = "lab_work"
primary_subnet_id = "subnet-0abcd1234ef567890" # Replace with actual subnet ID
subnet_count = 3
monitoring = true
^G Help ^O Write Out ^W Where Is ^K Cut ^T Execute ^C Location
^X Exit ^R Read File ^\ Replace ^U Paste ^J Justify ^/ Go To Line
nano terraform.tfvars
@23-22411-027-max →/workspaces/LAB11CC (main) $ touch locals.tf
nano locals.tf

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
nano
GNU nano 7.2 locals.tf *
is_production = var.environment == "prod"
monitoring_enabled = var.monitoring || local.is_production
}
^G Help ^O Write Out ^W Where Is ^K Cut ^T Execute ^C Location
^X Exit ^R Read File ^\ Replace ^U Paste ^J Justify ^/ Go To Line
0 0
Ln 54, Col 1 Spaces: 2 UTF-8

main.tf

```
variable "primary_subnet_id" {}
variable "subnet_count" {}
variable "monitoring" {}
output "resource_name" {
  value = local.resource_name
}

output "primary_public_subnet" {
  value = local.primary_public_subnet
}

output "subnet_count" {
  value = local.subnet_count
}
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS bash

```
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ terraform apply -auto-approve

api_session_token_output = <sensitive>
is_production = false
monitoring_enabled = true
primary_public_subnet = "subnet-0abcd1234ef567890"
resource_name = "lab_work-dev"
subnet_cidr_block_output = "10.0.30.0/24"
subnet_count = 3
@23-22411-027-max ➜/workspaces/LAB11CC (main) $
```

0 0 Ln 73, Col 1 Spaces: 2

Task4 and 5

main.tf U

main.tf

```
81
82  # Object variable
83  variable "server_config" {
84    type = object({
85      name           = string
86      instance_type  = string
87      monitoring     = bool
88      storage_gb     = number
89      backup_enabled = bool
90    })
91  }
92
93  output "server_config" {
94    value = var.server_config
95  }
```

main.tf U | terraform.tfvars U

terraform.tfvars

```
6   monitoring        = true
7   tags = {
8     Environment = "dev"
9     Project     = "sample-app"
10    Owner       = "platform-team"
11  }
12
13  server_config = {
14    name           = "web-server"
15    instance_type  = "t3.micro"
16    monitoring     = true
17    storage_gb     = 20
18    backup_enabled = false
19  }
20
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS bash

```
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ terraform apply -auto-approve
}
subnet_cidr_block_output = "10.0.30.0/24"
subnet_count = 3
tags = tomap({
  "Environment" = "dev"
  "Owner" = "platform-team"
  "Project" = "sample-app"
})
@23-22411-027-max ➜/workspaces/LAB11CC (main) $
```

main.tf U terraform.tfvars U

main.tf

```
107  variable "availability_zones" {
110  }
111
112  output "compare_collections" {
113    value = {
114      list_example  = var.server_names
115      tuple_example = var.server_metadata
116      set_example   = var.availability_zones
117    }
118  }
119
```

main.tf U | locals.tf U | terraform.tfvars U

locals.tf

```
locals {
  subnet_count          = var.subnet_count
  is_production         = var.environment == "prod"
  monitoring_enabled    = var.monitoring || local.is_production
}
locals {
  mutated_list  = setunion(var.server_names, ["web-3"])
  mutated_tuple = setunion([for t in var.server_metadata : tostring(t)
  mutated_set   = setunion(var.availability_zones, ["me-central-1c"])
}
```

```
  }
}
output "mutation_comparison" {
  value = {
    original_tuple = var.server_metadata
    mutated_tuple  = local.mutated_tuple
  }
}
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS bash

```
@23-22411-027-max →/workspaces/LAB11CC (main) $ terraform apply -auto-approve
}
subnet_cidr_block_output = "10.0.30.0/24"
subnet_count = 3
tags = tomap({
  "Environment" = "dev"
  "Owner" = "platform-team"
  "Project" = "sample-app"
})
@23-22411-027-max →/workspaces/LAB11CC (main) $
```

TASK 6

main.tf U × | locals.tf U | terraform.tfvars U

main.tf

```
}
# Optional tag (nullable / null default)
variable "optional_tag" {
  type        = string
  description = "A tag that may or may not be provided"
  default     = null
}

# Any type variable (dynamic)
variable "dynamic_value" {
  type        = any
  description = "A variable that can accept any data type"
  default     = null
}

# Output merged server tags
```

```
}
locals {
  server_tags = merge(
    { Name = "web-server" },
    var.optional_tag != null ? { Custom = var.optional_tag } : {}
  )
}
```


PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
bash
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ terraform apply -auto-approve
}
subnet_cidr_block_output = "10.0.30.0/24"
subnet_count = 3
tags = tomap({
"Environment" = "dev"
"Owner" = "platform-team"
"Project" = "sample-app"
})
@23-22411-027-max ➜/workspaces/LAB11CC (main) $
0 0
Ln 20, Col 1
Spaces: 4
UTF-8


@23-22411-027-max ➜/workspaces/LAB11CC (main) $ terraform apply -auto-approve
4,
true,
]
}
optional_tag = {
"Custom" = "dev"
"Name" = "web-server"
}
primary_public_subnet = "subnet-0abcd1234ef567890"
0 0
Ln 21, Col 1
Spaces:

```
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ terraform apply -auto-approve
}
subnet_cidr_block_output = "10.0.30.0/24"
subnet_count = 3
tags = tomap({
  "Environment" = "dev"
  "Owner" = "platform-team"
  "Project" = "sample-app"
})
@23-22411-027-max ➜/workspaces/LAB11CC (main) $
```

main.tf | locals.tf | terraform.tfvars

terraform.tfvars

```
11  }
12
13  server_config = {
14    name          = "web-server"
15    instance_type = "t3.micro"
16    monitoring    = true
17    storage_gb    = 20
18    backup_enabled = false
19  }
20  optional_tag = "dev"
21  dynamic_value = "hello"
22
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS                    bash

@23-22411-027-max ➜/workspaces/LAB11CC (main) $ terraform apply -auto-approve
subnet_cidr_block_output = "10.0.30.0/24"
subnet_count = 3
tags = tomap({
  "Environment" = "dev"
  "Owner" = "platform-team"
  "Project" = "sample-app"
})
value_received = "hello"
@23-22411-027-max ➜/workspaces/LAB11CC (main) $
```

0 0 Ln 22, Col 1 Spaces: 4

terraform.tfvars

```
13  server_config = {
14    name          = "web-server"
15    instance_type = "t3.micro"
16    monitoring    = true
17    storage_gb    = 20
18    backup_enabled = false
19  }
20  optional_tag = "dev"
21  #dynamic_value = "hello"
22  dynamic_value = 42
23
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS                    bash

@23-22411-027-max ➜/workspaces/LAB11CC (main) $ terraform apply -auto-approve
subnet_cidr_block_output = "10.0.30.0/24"
subnet_count = 3
tags = tomap({
  "Environment" = "dev"
  "Owner" = "platform-team"
  "Project" = "sample-app"
})
value_received = 42
@23-22411-027-max ➜/workspaces/LAB11CC (main) $
```

main.tf | locals.tf | terraform.tfvars

terraform.tfvars

```
13  server_config = {
18    backup_enabled = false
19  }
20  optional_tag = "dev"
21  #dynamic_value = "hello"
22  #dynamic_value = 42
23  dynamic_value = ["a", "b", "c"]
24
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS bash

```
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ terraform apply -auto-approve
  "Owner" = "platform-team"
  "Project" = "sample-app"
})
value_received = [
  "a",
  "b",
  "c",
]
```

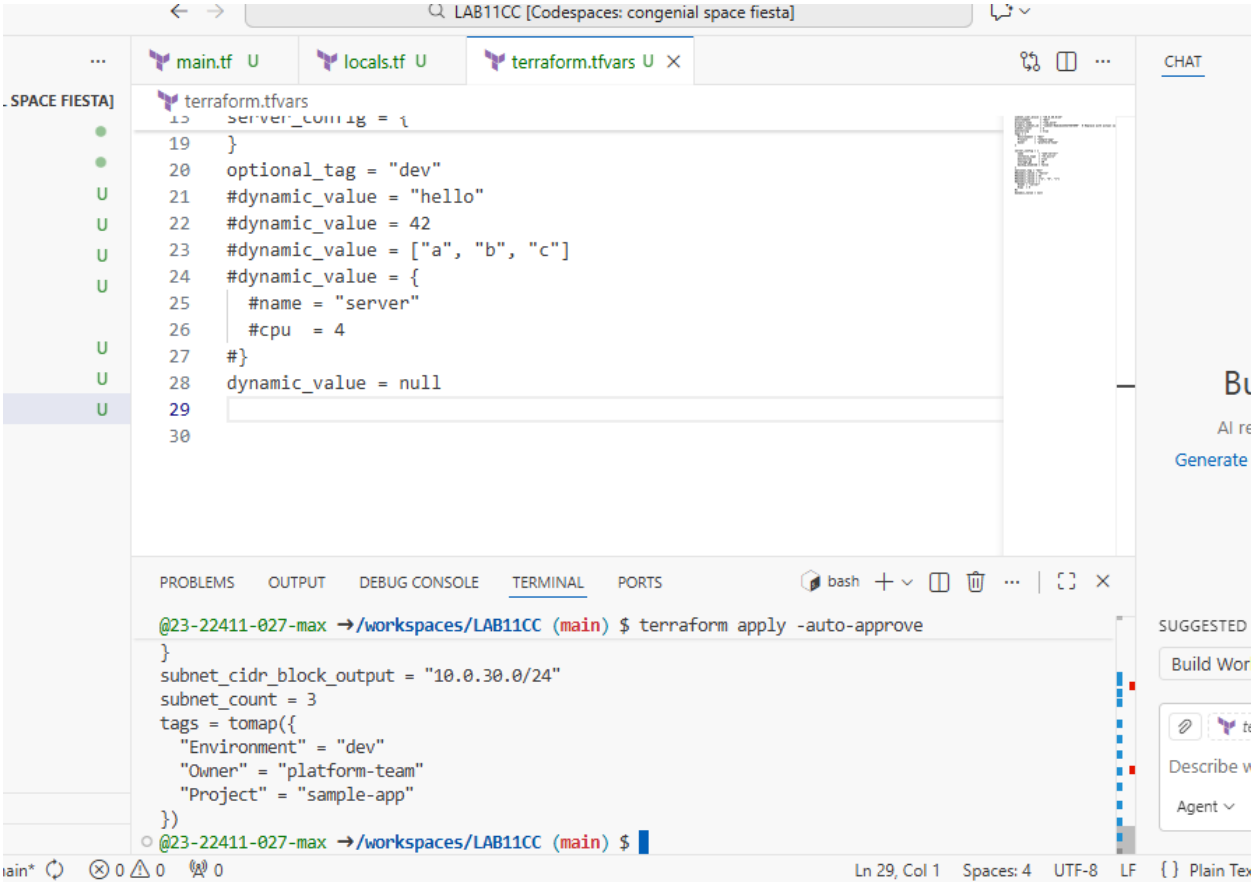
main.tf | locals.tf | terraform.tfvars

terraform.tfvars

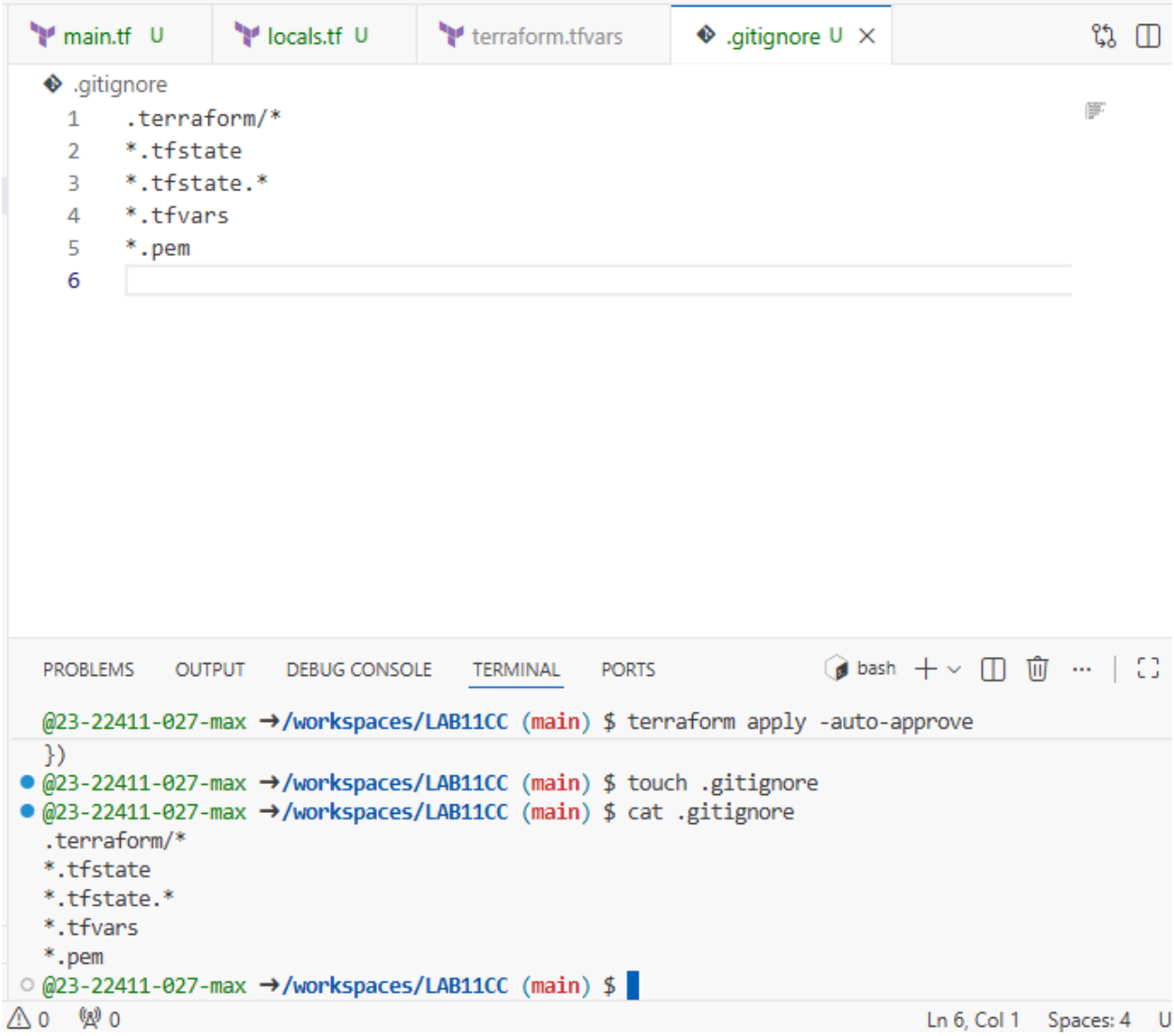
```
13  server_config = {
19  }
20  optional_tag = "dev"
21  #dynamic_value = "hello"
22  #dynamic_value = 42
23  #dynamic_value = ["a", "b", "c"]
24  dynamic_value = {
25    name = "server"
26    cpu  = 4
27  }
28
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS bash

```
@23-22411-027-max →/workspaces/LAB11CC (main) $ terraform apply -auto-approve
  "Environment" = "dev"
  "Owner" = "platform-team"
  "Project" = "sample-app"
})
value_received = {
  "cpu" = 4
  "name" = "server"
}
@23-22411-027-max →/workspaces/LAB11CC (main) $
```


LAB11CC [Codespaces: congenial space fiesta]
main.tf U
locals.tf U
terraform.tfvars U
terraform.tfvars
19 }
20 optional_tag = "dev"
21 #dynamic_value = "hello"
22 #dynamic_value = 42
23 #dynamic_value = ["a", "b", "c"]
24 #dynamic_value = {
25 #name = "server"
26 #cpu = 4
27 #}
28 dynamic_value = null
29
30
CHAT
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
bash
@23-22411-027-max →/workspaces/LAB11CC (main) $ terraform apply -auto-approve
}
subnet_cidr_block_output = "10.0.30.0/24"
subnet_count = 3
tags = tomap({
"Environment" = "dev"
"Owner" = "platform-team"
"Project" = "sample-app"
})
@23-22411-027-max →/workspaces/LAB11CC (main) $
SUGGESTED
Build Wor
Describe w
Agent
Ln 29, Col 1
Spaces: 4
UTF-8
LF

TASK7


main.tf U
locals.tf U
terraform.tfvars
.gitignore U
.gitignore
1 .terraform/*
2 *.tfstate
3 *.tfstate.*
4 *.tfvars
5 *.pem
6
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
bash
@23-22411-027-max →/workspaces/LAB11CC (main) $ terraform apply -auto-approve
})
@23-22411-027-max →/workspaces/LAB11CC (main) $ touch .gitignore
@23-22411-027-max →/workspaces/LAB11CC (main) $ cat .gitignore
.terraform/*
*.tfstate
.tfstate.
*.tfvars
*.pem
@23-22411-027-max →/workspaces/LAB11CC (main) $
0 0
Ln 6, Col 1
Spaces: 4
U

TASK 8

main.tf U | locals.tf U | terraform.tfvars | .gitignore U

main.tf

```
provider "aws" {
  shared_config_files      = ["~/.aws/config"]
  shared_credentials_files = ["~/.aws/credentials"]
}

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS bash

```
@23-22411-027-max ➜ /workspaces/LAB11CC (main) $ touch .gitignore
@23-22411-027-max ➜ /workspaces/LAB11CC (main) $ cat .gitignore
.terraform/*
*.tfstate
*.tfstate.*
*.tfvars
*.pem
@23-22411-027-max ➜ /workspaces/LAB11CC (main) $ > terraform.tfvars
> locals.tf
@23-22411-027-max ➜ /workspaces/LAB11CC (main) $
```

main.tf U | locals.tf U | terraform.tfvars | .gitignore U

main.tf

```
}
variable "vpc_cidr_block" {}
variable "subnet_cidr_block" {}
variable "availability_zone" {}
variable "env_prefix" {}
resource "aws_vpc" "myapp_vpc" {
  cidr_block = var.vpc_cidr_block
  tags = {
    Name = "${var.env_prefix}-vpc"
  }
}
resource "aws_subnet" "myapp_subnet_1" {
  vpc_id            = aws_vpc.myapp_vpc.id
  cidr_block        = var.subnet_cidr_block
  availability_zone = var.availability_zone
  tags = {
```

main.tf U | locals.tf U | terraform.tfvars | .gitignore U

terraform.tfvars

```
1   vpc_cidr_block      = "10.0.0.0/16"
2   subnet_cidr_block   = "10.0.10.0/24"
3   availability_zone   = "me-central-1a"
4   env_prefix          = "dev"
5
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ terraform init
terraform apply -auto-approve
  - subnet_cidr_block_output = "10.0.30.0/24" -> null
  - subnet_count             = 3 -> null
  - tags                     = {
      - Environment = "dev"
      - Owner       = "platform-team"
      - Project     = "sample-app"
    } -> null
aws_vpc.myapp_vpc: Creating...
```

```
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ terraform init
terraform apply -auto-approve
    } -> null
aws_vpc.myapp_vpc: Creating...
aws_vpc.myapp_vpc: Creation complete after 1s [id=vpc-090c7f501293f0384]
aws_subnet.myapp_subnet_1: Creating...
aws_subnet.myapp_subnet_1: Creation complete after 1s [id=subnet-08ce7fb98a2f88d85]

Apply complete! Resources: 2 added, 0 changed, 0 destroyed.
@23-22411-027-max ➜/workspaces/LAB11CC (main) $
```

```
15   resource "aws_subnet" "myapp_subnet_1" {
22   }
23   resource "aws_internet_gateway" "myapp_igw" {
24     vpc_id = aws_vpc.myapp_vpc.id
25     tags = {
26       Name = "${var.env_prefix}-igw"
27     }
28   }
29
30   resource "aws_route_table" "myapp_route_table" {
31     vpc_id = aws_vpc.myapp_vpc.id
32
33     route {
34       cidr_block = "0.0.0.0/0"
35       gateway_id = aws_internet_gateway.myapp_igw.id
36     }
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS bash

```
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ terraform apply -auto-approve

Plan: 2 to add, 0 to change, 0 to destroy.
aws_internet_gateway.myapp_igw: Creating...
aws_internet_gateway.myapp_igw: Creation complete after 0s [id=igw-07a16de195e0285de]
aws_route_table.myapp_route_table: Creating...
aws_route_table.myapp_route_table: Creation complete after 0s [id=rtb-0384ca0ebbb556f04]

Apply complete! Resources: 2 added, 0 changed, 0 destroyed.
@23-22411-027-max ➜/workspaces/LAB11CC (main) $
```

```
}
resource "aws_route_table_association" "a_rtb_subnet" {
  subnet_id      = aws_subnet.myapp_subnet_1.id
  route_table_id = aws_route_table.myapp_route_table.id
}
```

```
@23-22411-027-max →/workspaces/LAB11CC (main) $ terraform apply -auto-approve
    }

Plan: 1 to add, 0 to change, 0 to destroy.
aws_route_table_association.a_rtb_subnet: Creating...
aws_route_table_association.a_rtb_subnet: Creation complete after 1s [id=rtbassoc-07e9162144fd612
8c]

Apply complete! Resources: 1 added, 0 changed, 0 destroyed.
@23-22411-027-max →/workspaces/LAB11CC (main) $
```

0 0 Ln 46, Col 1 Spaces: 2 UTF-8

main.tf U × | locals.tf U | terraform.tfvars | .gitignore U

main.tf

```
30   resource "aws_route_table" "myapp_route_table" {
38     tags = {
40     }
41   }
42   resource "aws_route_table_association" "a_rtb_subnet" {
43     subnet_id      = aws_subnet.myapp_subnet_1.id
44     route_table_id = aws_route_table.myapp_route_table.id
45   }
46   resource "aws_default_route_table" "main_rt" {
47     default_route_table_id = aws_vpc.myapp_vpc.default_route_table_id
48
49     route {
50       cidr_block = "0.0.0.0/0"
51       gateway_id = aws_internet_gateway.myapp_igw.id
52     }
53
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS bash

```
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ terraform apply -auto-approve
      + vpc_id                     = (known after apply)
    }

Plan: 1 to add, 0 to change, 0 to destroy.
aws_default_route_table.main_rt: Creating...
aws_default_route_table.main_rt: Creation complete after 1s [id=rtb-07f30d7cd73903b86]

Apply complete! Resources: 1 added, 0 changed, 0 destroyed.
@23-22411-027-max ➜/workspaces/LAB11CC (main) $
```

0 Ln 58, Col 1 Spaces: 2 UTF

TASK 9

main.tf U | locals.tf U | terraform.tfvars | .gitignore U

main.tf

```
46   resource "aws_default_route_table" "main_rt" {
54     tags = {
56     }
57   }
58   variable "my_ip" {}
59
```

```
Apply complete! Resources: 1 added, 0 changed, 0 destroyed.
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ curl icanhazip.com
20.192.21.52
@23-22411-027-max ➜/workspaces/LAB11CC (main) $
```

main.tf | locals.tf | terraform.tfvars | .gitignore

terraform.tfvars

```
1   vpc_cidr_block     = "10.0.0.0/16"
2   subnet_cidr_block  = "10.0.10.0/24"
3   availability_zone  = "me-central-1a"
4   env_prefix         = "dev"
5   my_ip = "20.192.21.52/32"
6   instance_type = "t3.micro"
7   availability_zone = "me-central-1a"
8   env_prefix = "dev"
9
```

main.tf

```
59  resource "aws_default_security_group" "myapp_sg" {
61
62    ingress {
63      from_port   = 22
64      to_port     = 22
65      protocol    = "tcp"
66      cidr_blocks = [var.my_ip]
67    }
68
69    ingress {
70      from_port   = 80
71      to_port     = 80
72      protocol    = "tcp"
73      cidr_blocks = ["0.0.0.0/0"]
74    }
75
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS                                   bash

@23-22411-027-max ➜/workspaces/LAB11CC (main) $ terraform apply -auto-approve
  configuration.

  To silence these warnings, use TF_VAR_... environment variables to provide certain "global"
  settings to all configurations in your organization. To reduce the verbosity of these
  warnings, use the -compact-warnings option.


Apply complete! Resources: 1 added, 0 changed, 0 destroyed.
@23-22411-027-max ➜/workspaces/LAB11CC (main) $
```

```
0  0                                                  Ln 8, Col 2  Spaces: 4  UTF-8
```

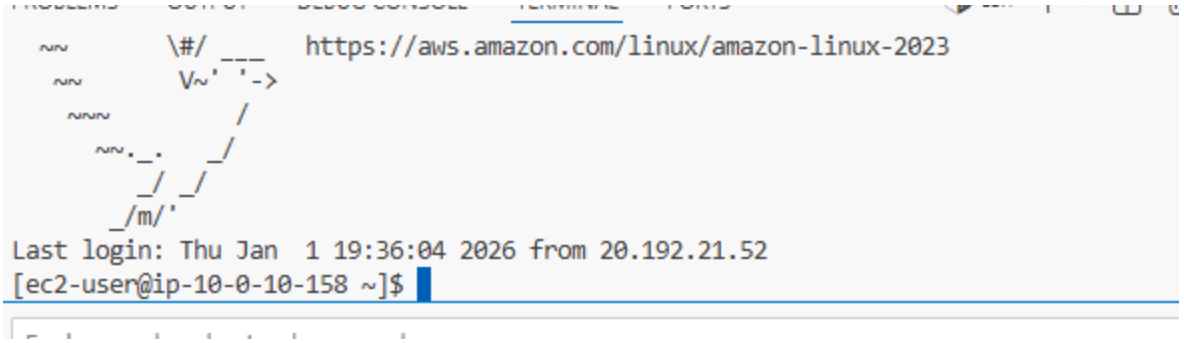
main.tf | locals.tf | terraform.tfvars | .gitignore

main.tf

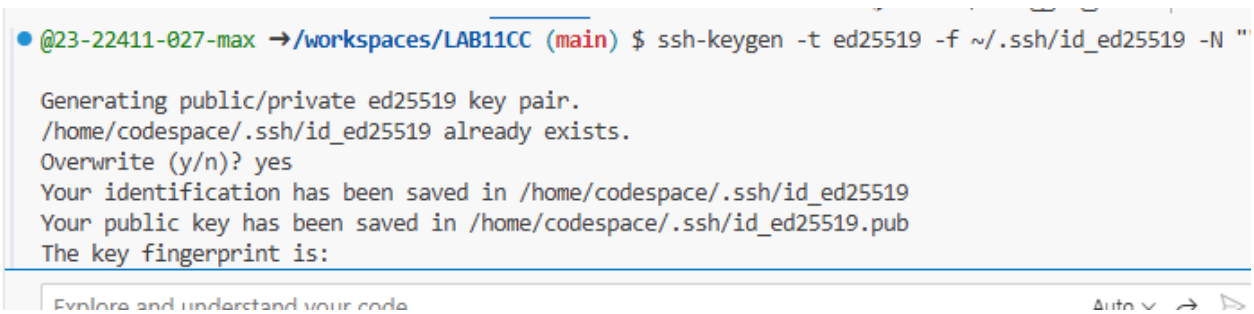
```
59   resource "aws_default_security_group" "myapp_sg" {
83     tags = {
84       Name = "${var.env_prefix}-sg"
85     }
86   }
87   variable "instance_type" {}
88   resource "aws_instance" "myapp-server" {
89     ami                         = "ami-05524d6658fcf35b6" # Amazon Linux 2
90     instance_type               = var.instance_type
91     subnet_id                   = aws_subnet.myapp_subnet_1.id
92     security_groups             = [aws_default_security_group.myapp_sg.id]
93     availability_zone           = var.availability_zone
94     associate_public_ip_address = true
95     key_name                    = "MyED25519Key"
96
97
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS                                   bash

@23-22411-027-max ➜/workspaces/LAB11CC (main) $ terraform apply -auto-approve
aws_instance.myapp-server: Still creating... [00m10s elapsed]
aws_instance.myapp-server: Creation complete after 13s [id=i-0ced5a19367a5b414]

Apply complete! Resources: 1 added, 0 changed, 0 destroyed.

Outputs:

aws_instance_public_ip = "40.172.113.216"
@23-22411-027-max ➜/workspaces/LAB11CC (main) $
```

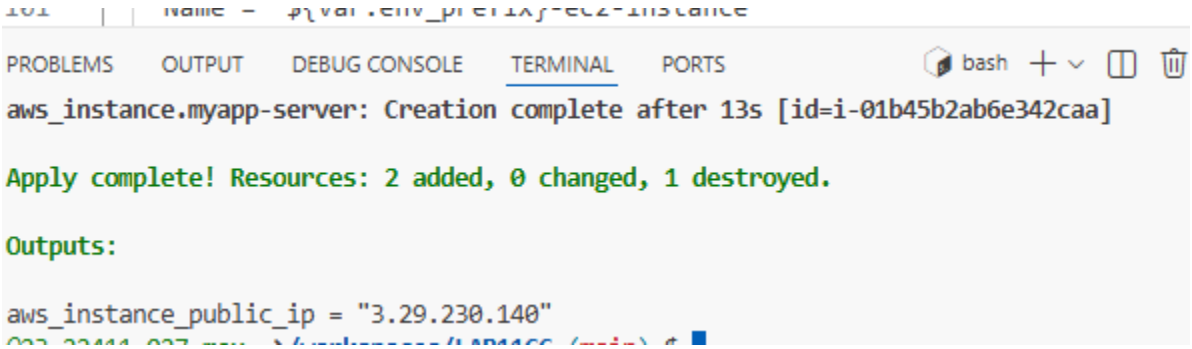
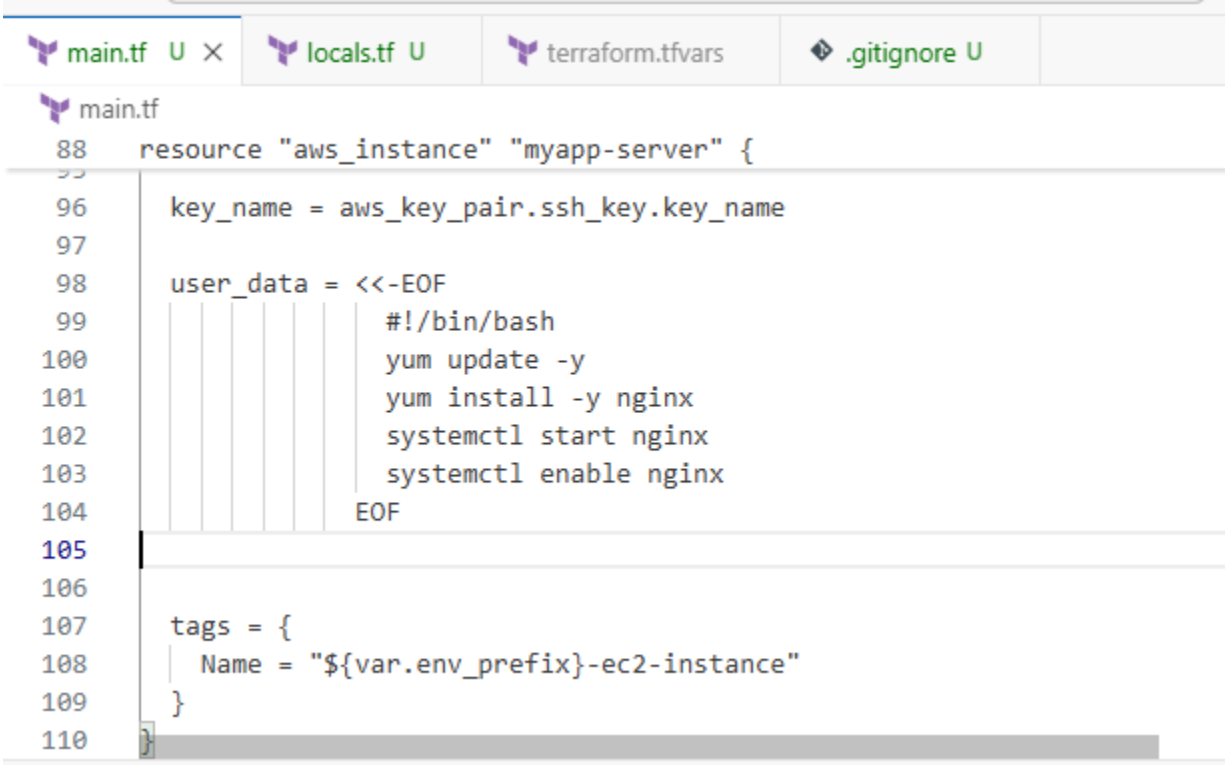
```
0  0                                                  Ln 87, Col 29  Spaces: 2
```


~~ \#/ ___ https://aws.amazon.com/linux/amazon-linux-2023
~~ V~' '->
~~~ /
~~._. _/
_/ _/
_/m/'
Last login: Thu Jan 1 19:36:04 2026 from 20.192.21.52
[ec2-user@ip-10-0-10-158 ~]$


~~ \#/ ___ https://aws.amazon.com/linux/amazon-linux-2023
~~ V~' '->
~~~ /
~~._. _/
_/ _/
_/m/'
Last login: Thu Jan 1 19:36:04 2026 from 20.192.21.52
[ec2-user@ip-10-0-10-158 ~]$ exit
Explore and understand your code
Auto


@23-22411-027-max →/workspaces/LAB11CC (main) $ ssh-keygen -t ed25519 -f ~/.ssh/id_ed25519 -N "
Generating public/private ed25519 key pair.
/home/codespace/.ssh/id_ed25519 already exists.
Overwrite (y/n)? yes
Your identification has been saved in /home/codespace/.ssh/id_ed25519
Your public key has been saved in /home/codespace/.ssh/id_ed25519.pub
The key fingerprint is:


main.tf U
locals.tf U
terraform.tfvars
.gitignc
main.tf
103
104 output "aws_instance_public_ip" {
105 value = aws_instance.myapp-server.public_ip
106 }
107 resource "aws_key_pair" "ssh_key" {
108 key_name = "serverkey"
109 public_key = file("~/.ssh/id_ed25519.pub")
110 }
111 key_name = aws_key_pair.ssh_key.key_name
112


~~ \###|
~~ \#/ ___ https://aws.amazon.com/linux/amazon-linux-2023
~~ V~' '->
~~~ /
~~._. _/
_/ _/
_/m/'
[ec2-user@ip-10-0-10-253 ~]$


PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
bash
aws_instance.myapp-server: Creation complete after 13s [id=i-01b45b2ab6e342caa]
Apply complete! Resources: 2 added, 0 changed, 1 destroyed.
Outputs:
aws_instance_public_ip = "3.29.230.140"


main.tf U
locals.tf U
terraform.tfvars
.gitignore U
main.tf
88 resource "aws_instance" "myapp-server" {
96 key_name = aws_key_pair.ssh_key.key_name
97
98 user_data = <<-EOF
99 #!/bin/bash
100 yum update -y
101 yum install -y nginx
102 systemctl start nginx
103 systemctl enable nginx
104 EOF
105
106
107 tags = {
108 Name = "${var.env_prefix}-ec2-instance"
109 }
110 }
~~~

```
110    }
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS bash

```
aws_instance.myapp-server: Creation complete after 12s [id=i-0a1e9d0e9464899c1]

Apply complete! Resources: 1 added, 0 changed, 1 destroyed.

Outputs:

aws_instance_public_ip = "3.29.27.207"
@23-22411-027-max →/workspaces/LAB11CC (main) $
```

Explore and understand your code Auto

```
service --status-all
@23-22411-027-max →/workspaces/LAB11CC (main) $ ^C
@23-22411-027-max →/workspaces/LAB11CC (main) $ chmod 600 MyED25519Key.pem
@23-22411-027-max →/workspaces/LAB11CC (main) $ ssh -i /path/to/MyED25519Key.pem ec2-user@3.29.2
7.207
```

Not secure 3.29.27.207

Welcome to nginx!

If you see this page, the nginx web server is successfully installed and working. Further configuration is required.

For online documentation and support please refer to nginx.org.
Commercial support is available at nginx.com.

Thank you for using nginx.

```
  associate_public_ip_address = true

  key_name = aws_key_pair.ssh_key.key_name

  user_data = file("entry-script.sh")

  tags = {
    Name = "${var.env_prefix}-ec2-instance"
  }
}
```

```
@23-22411-027-max ➜/workspaces/LAB11CC (main) $ cat > entry-script.sh <<'EOF'
#!/bin/bash
yum update -y
yum install -y nginx
systemctl start nginx
systemctl enable nginx
EOF
@23-22411-027-max ➜/workspaces/LAB11CC (main) $
```

```
  user_data = file("entry-script.sh")

  tags = {
    Name = "${var.env_prefix}-ec2-instance"
  }
}

output "aws_instance_public_ip" {
  value = aws_instance.myapp-server.public_ip
}
resource "aws_key_pair" "ssh_key" {
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS                bash

@23-22411-027-max ➜/workspaces/LAB11CC (main) $ terraform apply -auto-approve
aws_instance.myapp-server: Still creating... [00m10s elapsed]
aws_instance.myapp-server: Creation complete after 13s [id=i-0349129bb18670e3f]

Apply complete! Resources: 1 added, 0 changed, 1 destroyed.

Outputs:

aws_instance_public_ip = "3.29.50.125"
@23-22411-027-max ➜/workspaces/LAB11CC (main) $
```

0 Ln 98, Col 38 Spaces: 2 UT

Cleaning


@23-22411-027-max →/workspaces/LAB11CC (main) $ terraform destroy -auto-approve
aws_internet_gateway.myapp_igw: Destroying... [id=igw-07a16de195e0285de]
aws_instance.myapp-server: Still destroying... [id=i-0349129bb18670e3f, 00m10s elapsed]
aws_internet_gateway.myapp_igw: Still destroying... [id=igw-07a16de195e0285de, 00m10s elapsed]
aws_instance.myapp-server: Still destroying... [id=i-0349129bb18670e3f, 00m20s elapsed]
aws_internet_gateway.myapp_igw: Still destroying... [id=igw-07a16de195e0285de, 00m20s elapsed]
aws_instance.myapp-server: Still destroying... [id=i-0349129bb18670e3f, 00m30s elapsed]
aws_internet_gateway.myapp_igw: Still destroying... [id=igw-07a16de195e0285de, 00m30s elapsed]
aws_instance.myapp-server: Still destroying... [id=i-0349129bb18670e3f, 00m40s elapsed]
aws_internet_gateway.myapp_igw: Still destroying... [id=igw-07a16de195e0285de, 00m40s elapsed]
aws_instance.myapp-server: Still destroying... [id=i-0349129bb18670e3f, 00m50s elapsed]
aws_internet_gateway.myapp_igw: Still destroying... [id=igw-07a16de195e0285de, 00m50s elapsed]
aws_internet_gateway.myapp_igw: Destruction complete after 58s
aws_instance.myapp-server: Still destroying... [id=i-0349129bb18670e3f, 01m00s elapsed]
aws_instance.myapp-server: Destruction complete after 1m1s
aws_key_pair.ssh_key: Destroying... [id=serverkey]
aws_subnet.myapp_subnet_1: Destroying... [id=subnet-08ce7fb98a2f88d85]
aws_default_security_group.myapp_sg: Destroying... [id=sg-08fc31a598af17ccf]
aws_default_security_group.myapp_sg: Destruction complete after 0s
aws_key_pair.ssh_key: Destruction complete after 0s
aws_subnet.myapp_subnet_1: Destruction complete after 1s
aws_vpc.myapp_vpc: Destroying... [id=vpc-090c7f501293f0384]
aws_vpc.myapp_vpc: Destruction complete after 1s
Destroy complete! Resources: 9 destroyed.
@23-22411-027-max →/workspaces/LAB11CC (main) $

```
@23-22411-027-max →/workspaces/LAB11CC (main) $ cat terraform.tfstate
cat terraform.tfstate.backup
            "owner_id": "212208750468",
            "region": "me-central-1",
            "tags": {
              "Name": "dev-vpc"
            },
            "tags_all": {
              "Name": "dev-vpc"
            }
          },
          "sensitive_attributes": [],
          "identity_schema_version": 0,
          "identity": {
            "account_id": "212208750468",
            "id": "vpc-090c7f501293f0384",
            "region": "me-central-1"
          },
          "private": "eyJzY2hlbWFfdmVyc2lvbiI6IjEifQ=="
        }
      ]
    }
  ],
  "check_results": null
}
@23-22411-027-max →/workspaces/LAB11CC (main) $
```

```
  }
@23-22411-027-max →/workspaces/LAB11CC (main) $ git status
On branch main
Your branch is up to date with 'origin/main'.

Untracked files:
  (use "git add <file>..." to include in what will be committed)
        .gitignore
        .terraform.lock.hcl
        aws/
        awscliv2.zip
        entry-script.sh
        locals.tf
        main.tf
```