PROWESS

Behind the Report—Testing Addendum:

Improving Price and Performance with AWS® Spot-Based Instances

Methodology

Summary

Prowess Consulting tested on-demand and spot-based Amazon® Elastic Compute Cloud™ (Amazon EC2®) instances with the Financial Services Workload Samples with Monte Carlo European Options simulation workload. In this study sponsored by Intel, our analysis found that instances based on 3rd Gen Intel® Xeon® Scalable processors are top performers in terms of throughput and speed, while instances based on 2nd Gen Intel® Xeon® Scalable processors are the top price-performance option, compared to instances with AMD EPYC™ and AWS Graviton® processors.

Testing Procedures

The Prowess engineers tested the following instance types as on-demand and spot-based instances:

- C5.24xlarge, powered by a 2nd Gen Intel Xeon Scalable processor
- C6i.32xlarge, powered by a 3rd Gen Intel Xeon Scalable processor
- M6i.32xlarge, powered by a 3rd Gen Intel Xeon Scalable processor
- C5a.xlarge, powered by a 2nd Gen AMD EPYC processor
- M6a.48xlarge, powered by a 3rd Gen AMD EPYC processor
- C7g.16xlarge, powered by an Amazon Web Services® (AWS®) Graviton3 processor

We conducted the spot-based testing in three different AWS Regions and at three different times of day to explore the consistency of the instance availability.

On-Demand Testing and Spot-Based Testing

1. Sign in to https://aws.amazon.com.
2. Click **Services > EC2**.
3. In the **Region** drop-down box, select the test region.
4. For on-demand testing, select **Launch instances**. For spot-based testing, select **Spot Requests** and then click **Request Spot Instances**.
5. Use the following parameters when creating the instance:
    - **Name**: Enter a name for the Amazon EC2 instance.
    - **Application and operating system (OS) images**: Red Hat® Enterprise Linux® 8 (HVM), solid-state drive (SSD) volume type.

- **Architecture**: 64-bit (x86) for the Intel® and AMD® processor–based instances and 64-bit (Arm) for the Graviton processor–based instances.
- **Instance type**: Select the test instance type.
- **Key pair (login)**: Use an existing key pair or create a new key pair.
- **Network settings**: Select an existing security group or create a new security group.
- **Configure storage**: 40 GiB General Purpose SSD (gp2).

6. Use the following parameters when creating the instance:
    - **AMI**: Red Hat® Enterprise Linux® 8 (HVM), solid-state drive (SSD) volume type.
    - **Key pair (login)**: Use an existing key pair or create a new key pair.
    - **EBS Volumes**: 40 GiB General Purpose SSD (gp2).
    - **Target capacity**:
        i. Select **Maintain target capacity**.
        ii. Select **Stopped**.
    - **Instance type requirements**:
        i. Select **Manually select instance types**.
        ii. Select the test instance type.
    - Click **Launch**.
    - Click **Launch Instance**.
7. Create a Secure Shell (SSH) connection to the instance by utilizing the public IPv4 address and the key pair.
8. Run the following commands to install updates:

```
yum –y update
reboot
```

9. Run the following commands to install prerequisite packages:

```
yum install wget  git  bison  flex  php cmake  clang  python3-pip –y
yum install at-spi2-core nss gtk3 libdrm mesa-libgbm libnotify  xdg-utils –y
yum install ncurses-compat-libs make automake gcc gcc-c++ kernel-devel –y
```

10. Run the following command to verify the version of Git installed:

```
git ––version = git version 2.27.0
```

11. Run the following commands to clone the Monte Carlo European Options Git repository:

```
mkdir /Monte
cd /Monte
git init
git clone https://github.com/intel/Financial-Services-Workload-Samples.git
cd Financial-Services-Workload-Samples/
```

12. Run the following commands to download and install the compiler and libraries:

```
wget https://registrationcenter-download.intel.com/akdlm/irc_nas/18679/l_HPCKit_p_2022.2.0.191_of-
fline.sh
wget https://registrationcenter-download.intel.com/akdlm/irc_nas/18673/l_BaseKit_p_2022.2.0.262_of-
fline.sh
```

13. Run the following command to install the Intel® oneAPI HPC Toolkit (HPC Kit):

```
./ l_HPCKit_p_2022.2.0.191_offline.sh
```

14. Follow the prompt to complete the installation.
15. Run the following command to install the Intel oneAPI Base Toolkit (Base Kit):

```
./ l_BaseKit_p_2022.2.0.262_offline.sh [follow prompt to complete installation]
```

16. Follow the prompt to complete the installation.

17. Run the following commands to build the Monte Carlo European Options workload:

```
cd MonteCarloEuropeanOptions
make clean
source /opt/intel/oneapi/setvars.sh
make
cp MonteCarloInsideBlockingDP.avx512 MPTest
cd MPTest
ls MPTEST
```

18. Run the following commands to set the parameters required to run the workload:

```
lscpu
export PR=<"Number OF Cores in the system reported by lscpu">
export OMP_NUM_THREAD=1
```

19. Run one of the following commands for the specified instance type to run the Monte Carlo European Options workload (note that Intel provided the Graviton compiled workload file to the Prowess Engineering team):
    - Intel processor–based instances:

```
./runbatch.sh MonteCarloInsideBlockingDP.avx512
```

    - AMD processor–based instances:

```
./runbatch.sh MonteCarloInsideBlockingDP.amd
```

    - Graviton processor–based instances:

```
./runbatch.sh MonteCarloInsideBlockingDP.gcc
```

20. Run the following command to collect the results for the run:

```
./getresult.sh 1
```

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