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Transcript

00:00:04 Speaker 2

Listen, we're going to look at Sagemaker domains and the Sagemaker Studio user interface.

00:00:12 Speaker 2

We've seen how to create Jupyter notebook instances. Unfortunately they do have some limitations, hence they were replaced with the newer Sagemaker Studio.

00:00:24 Speaker 2

So we're going to look in this lesson as to what those limitations were and how Sagemaker Studio addresses them.

00:00:33 Speaker 2

We're also going to look at the statutes you require to perform in order to consume Sagemaker Studio, specifically the creation of a Sagemaker domain. We are then going to look at some of the benefits and the improvements available within the Sagemaker Studio user interface. So let's think first of all about the Jupyter instances. We can create a Jupyter Notebook instance as we saw in the last demonstration.

00:01:02 Speaker 2

But those Jupiter Lab instances are created on a one to one basis, aligned to a specific user. Now if we imagine a team of multiple data scientists, each one launching A Jupyter notebook instance, we end up with lots of notebook instances. Each one is being billed against our account, and it seems a little bit wasteful to have multiple separate.

00:01:32 Speaker 2

Instances for that. What makes this worse is that these notebook instances do not shut down by themselves. They need to be manually shut down.

00:01:41 Speaker 2

So that makes it the responsibility of the user. But the user is simply focused on consuming the Jupyter interface. They maybe are not thinking about shutting down notebooks.

00:01:54 Speaker 2

Another issue we have with Jupyter lab is we don't have any experiment tracking.

00:02:00 Speaker 2

We'll talk more about that in a moment, but there's no native experiment tracking further. There's no automated git setup. It's up to the user to use the Git plugin to Jupyterlab to explicitly clone in any repository.

00:02:16 Speaker 2

Each user is responsible for managing their own instance, stopping it and starting it, and ensuring it stays stopped to eliminate unwanted spend. So if we have that increased responsibility in the user as an increased risk of extra charges. Further, we are limited in Jupyter lab to just the functionality of Jupyter lab if we want to use.

00:02:44 Speaker 2

Additional functionality that Sagemaker might expose.

00:02:47 Speaker 2

Then that's not directly available to us within the Jupyter lab interface. It'd be nicer to have a purpose built machine learning integrated development environment that would give me access to those tools as well as Jupyter. Now we mentioned experiment tracking there when we have a data scientist who's performing multiple training jobs in order to find the best model, the best combination of.

00:03:17 Speaker 2

Set an algorithm and feature engineering and hyperparameters to get the best results. Well, if we were to challenge them. Have you got the hyperparameters that you use from your best attempt 3 iterations ago? The result you might get from the data scientists could be varied, which you might get back is not sure. I'm now on my next iteration and my one after that. I've already forgotten what I did an hour ago. Now I'm not advocating that approach.

00:03:45 Speaker 2

I'm simply saying that a number of data scientists.

00:03:48 Speaker 2

Might work in a sort of continuous improvement way, but maybe are not that great at reproducibility about being able to go back to a point in time and say actually what I had earlier was better and knowing how to reproduce exactly what they did earlier because they logged precisely the combination of data sets and algorithm and features engineered at that point. So we need to make it easy for them and the way that we do that is offering.

00:04:18 Speaker 2

A framework.

00:04:19 Speaker 2

So the data scientist doesn't need to be systematic in their approach to experiment management, but we need to make it easy for them to record their inputs and outputs as an experiment like

experiment one is using this data set, this version of the algorithm, and this particular training job with these hyperparameter values. Then when they look at the resulting model and look at the evaluating its performance, they can compare and contrast the results.

00:04:48 Speaker 2

Against each different training iteration. Now natively when we had notebook instances in Sagemaker, there wasn't native support to do that then data scientists would need to use a third party tool such as Comma ML or True Era, something like that. And that would mean an additional subscription cost to that software supplier. So wouldn't it be nice is as we are solving some of the limitations of Jupyter Notebook?

00:05:19 Speaker 2

If we could solve that problem too. So the solution that AWS have is the Sagemaker Studio built upon the Sagemaker domain. Let's take a look.

00:05:31 Speaker 2

A Sagemaker domain is an administrative boundary we create within Sagemaker. We can have multiple Sagemaker domains if we wish, but a Sagemaker domain has a number of component parts. Firstly, it has a common file system. This file system is based on the EFS file system, the Elastic File System. Now this is essentially A serverless managed files share based on the NFS protocol. It's been available within the.

00:06:01 Speaker 2

To service for many years, but here we automatically create you file share that can be mounted by NFS.

00:06:09 Speaker 2

Then we need a user profile. A user profile is made within the domain. I can't use the Sagemaker domain unless I have a user profile. Having an AWS user account is not enough here. I need a user account to get into the Sagemaker console. But if I want to launch into Sagemaker Studio, I need to have a defined user profile for the domain I wish to consume.

00:06:40 Speaker 2

Then within the Sagemaker domain, I would launch the Sagemaker Studio. This would open up as another tab in my browser. Now when I get into the Sagemaker Studio, I then have a range of options of different applications I could use. The primary one I'm going to be interested in using is Jupyter Lab.

00:07:02 Speaker 2

It's the one we are used to, so I can now get into Jupiter Lab via the Studio interface. But the Studio interface gives me so much more than just Jupyterlab. I can consume other services directly from that interface, whether it be to create large compute clusters, to run training and large language models, or whether to access capabilities like Jumpstart, which will allow me to immediately deploy marketplace models.

00:07:33 Speaker 2

There's numerous features accessible to me directly within Studio, not just playing Jupiter Lab, but we have other applications accessible to us as well, like Rstudio. Many data scientists and statisticians have used the R programming language in the Rstudio integrated development environment and are happy to continue using that for their machine learning development, so we provide that as a hosted user interface.

00:08:01 Speaker 2

As well. So you are giving the option to the user profile. Which application would you like to use? And then I click on that option and a new interface is opened up. So we can have hosted Jupyter or hosted Rstudio. Although you will need a separate license from R in order to use Rstudio.

00:08:21 Speaker 2

We also have Code Editor, which is essentially Microsoft Visual Studio Code hosted within Sagemaker Studio. OK, that gives us an alternative interface to Jupyter. And lastly, we have Studio Classic. When Sagemaker Studio first launched, it looked a little bit different and that was what we originally called Studio, but we've now moved that to be called Studio Classic.

00:08:49 Speaker 2

And we're really just leaving it in there to gain access to some legacy features that haven't been turned off yet. O If you're brand new to using Sagemaker Domain and Studio, ignore Studio Classic. It's really only there for people who started with the earlier version of Stage Maker Studio.

00:09:10 Speaker 2

We also need to specify an execution role. In other words, what security context are we going to run the studio under, which will determine what features we are able to use of Sagemaker and will determine what, for example, S3 buckets we can consume or indeed interface with any other AWS service.

00:09:32 Speaker 2

So a Sagemaker domain and the Sagemaker Studio is going to give us a number of benefits. It's going to give us access to shared spaces. In other words, I can have multiple users of my Sagemaker domain who can collaborate in the same shared space. I have the option of sharing Jupyter notebooks via links to make it, again, easier to collaborate.

00:09:57 Speaker 2

I can have simple integration with git whereby my Jupyterlab interface will be automatically launched with my git repository preloaded into it, encouraging the use of git version tracking right from the beginning.

00:10:14 Speaker 2

I get access to experiment tracking now, experiment tracking. We have something called Sagemaker Experiments, and yet again with AWS, everything is changing all of the time and we're

seeing a gradual shift away from Sagemaker Experiments to something called ML Flow. But I think the point still stands that by moving to Sagemaker Domain and Sagemaker Studio, there are options for us now about using.

00:10:44 Speaker 2

And native experimentation management solution, whether it's Sagemaker experiments or the newer ML flow, we gain access to automated workflows within Sagemaker Studio. We can create and manage Sagemaker pipelines. Now a pipeline is just an orchestrated set of activities in a sequence. So simplest level, I might have two pipelines, one for training a model and one for.

00:11:14 Speaker 2

Inference A.

00:11:16 Speaker 2

Training pipeline might for example, clean up my data, feature, engineer it and then train the model. An inference pipeline might take input from a user, clean and prepare it, pass it to the model and get a prediction back. So it allows us to build automation around what we are trying to do. So Sagemaker pipelines is a major advantage to have and we only get it if we use Sagemaker Studio.

00:11:45 Speaker 2

We further get fine grained access in terms of IAM policies, so we can be absolutely explicit about what permissions we want to delegate and for what purposes within our ML pipeline. Maybe to specific datasets or maybe to certain algorithms, or maybe to certain Sagemaker pipelines. All of these can be locked down so that you can only consume the ones that you've explicitly been granted for.

00:12:15 Speaker 2

So we have a Sagemaker domain which is an administrative boundary for Sagemaker Studio. We are permitted to create more than one Sagemaker domain. If you need to ring fence maybe different projects or in different business units away from one another. We need to define our user profiles within each Sagemaker domain in order to connect to it and consume the Sagemaker Studio interface.

00:12:42 Speaker 2

Each Sagemaker domain has its own Elastic File system, In other words, a shared managed file system that can be accessed by all users of that domain. Now a small caveat here, EFS, although part of a Sagemaker domain, played a far greater role in Sagemaker Classic now that Sagemaker Classic is going away.

00:13:08 Speaker 2

We are kind of de emphasizing using EFS.

00:13:12 Speaker 2

Because of performance reasons, and I'll talk more about that later on.

00:13:17 Speaker 2

Let's now look at how we can gain access to the Sagemaker Studio. Here we are in the AWS Management Console.

00:13:25 Speaker 2

I've already clicked into the Amazon Sagemaker AI link and we are now looking at the Applications and Ides section of the sidebar on the left hand side. Now if we want to get into this studio, we're going to have to click the Studio link. But notice just before we do this that we have a warning in this particular screenshot. This is just telling us that Jupyter Lab 3 notebooks on Sagemaker Studio Classic is going end of support.

00:13:55 Speaker 2

On the 31st of December. Now we're well past that point now, however, there are still customers out there who are using Sagemaker Studio Classic even though we're past the point of end of support. So just be aware of that. Ideally, we should all be in Jupiter Lab for at least and we should be using Sagemaker Studio here. We're going to click on the link to create a Sagemaker domain. The domain is the prerequisite for gaining access to Sagemaker.

00:14:26 Speaker 2

When we create our domain, we'll be prompted if we want a single user quick setup or if we want to set up for organizations.

00:14:35 Speaker 2

So which one should we choose?

00:14:38 Speaker 2

Well, if we are going to create a Sagemaker domain purely for testing or just learning Sagemaker Studio, then the quickest time to value would be with a quick setup. But there are some limitations.

00:14:55 Speaker 2

This will use your region's default virtual private cloud. Now that is network, which is intended for experimentation and has no real network security rules set up, so it's not the best environment for production workloads. It's only really there to allow you to experiment. So we would say if you use quick setup it should only be used for personal development or proof of concept and nothing that is production.

00:15:26 Speaker 2

So when would I use the manual setup? Well if I want total control over security, infrastructure and compliance. In other words anything pre production or production you want that to be a manually set up Sagemaker domain. For example maybe you want to use encryption and custom encryption

using keys that are defined and allowed for use for that purpose. Or maybe you want to leverage customer authentication.

00:15:56 Speaker 2

Mechanisms. Maybe you are already using the AWS Identity Center for Federated login using Microsoft Entra. Or maybe you need to have very fine grained control over which users or which security context is used for running a training job. Anything like that definitely requires a manual setup.

00:16:19 Speaker 2

So we should be choosing manual setup when we need that precision over security, when we need integration with existing infrastructure, which could simply mean an existing network, virtual private cloud, a VPC where you have existing resources that you need to interact with rather than using the default VPC.

00:16:42 Speaker 2

When you need strong compliance with organizational policies, so we need to integrate with those policies set at an Oracle level. When we need to have cost optimization for our production deployments, We have control over every element of what we provision and whenever we need any custom network provision. For example, maybe your consumption of Sagemaker comes from a private network.

00:17:08 Speaker 2

Maybe an on premises network that is rooted in via direct connect? Maybe we don't want to support Sagemaker accessed over the Internet? Any rules like that? You're going to need a manual setup of your Sagemaker domain.

00:17:23 Speaker 2

And as I mentioned, custom authentication methods. So leveraging Federated login, Microsoft Entrust through Identity Center, anything that is SAML based is good to have to be done through a manual setup of your domain.

00:17:38 Speaker 2

Once your Sagemaker domain has been provisioned, you will see the interface changed slightly. Rather than being prompted to create a Sagemaker domain, you are now being prompted to open Studio when you are in the Studio section of the Applications and Ides Navbar item notice.

00:17:59 Speaker 2

Just above where it says Open Studio, you've got user profile. Now in this particular example I used quick setup, so it's created me as Sagemaker domain and it's created me a default user profile. So I can now pick what user in that Sagemaker domain I want to use. And I could click the Open Studio link If however, I wanted to look at other users that are available for me to use in that domain or if I want to create a new.

00:18:29 Speaker 2

User profile I would have to come across on the left side of the NAV bar, find admin configurations and find domains. If we click on domains we should see the Sagemaker domain that has been created for us. Once we've clicked on domains we can see our Sagemaker domain that has been created. In this example I can see mine is called Quick setup domain and then a unique date and timestamp after it. But if you were creating a manual domain you would have had the ability.

00:18:59 Speaker 2

To influence that name, I could see that my domain is in service and ready to go.

00:19:04 Speaker 2

If I want to see the properties of that domain, including what user profiles have been defined within it, I would need to click directly on that blue text where it says Quick Setup domain. In other words, the name of the domain itself is a link.

00:19:21 Speaker 2

So we can now see our Sagemaker domain properties. We can see more about when it was created or last modified, what virtual private cloud that it's using, and most importantly that it is ready for use. Now I can see a number of tabs along the top. We are in the Domain settings tab by default.

00:19:40 Speaker 2

I want to go to the User profiles tab and see what users are defined in this domain that will be allowed to launch the Sagemaker Studio.

00:19:50 Speaker 2

So here we are in the User profiles tab of the Sagemaker domain. I can see in this example I have a single user profile defined. Now user profiles do equate to a person. So myself as Alistair I would have a login. Here I would be defined as a user profile. If I wanted another user to also login then I would need to add that user profile here to enable them to be permitted.

00:20:20 Speaker 2

To use one or more of the Sage Maker Studio applications. Now let's say I want to launch Sage Maker Studio. I can see for each user profile listed there's a button on the far right hand side. That button simply says launch, but it's a button and a drop down list at the same time. So if I click on the word launch, what else see there?

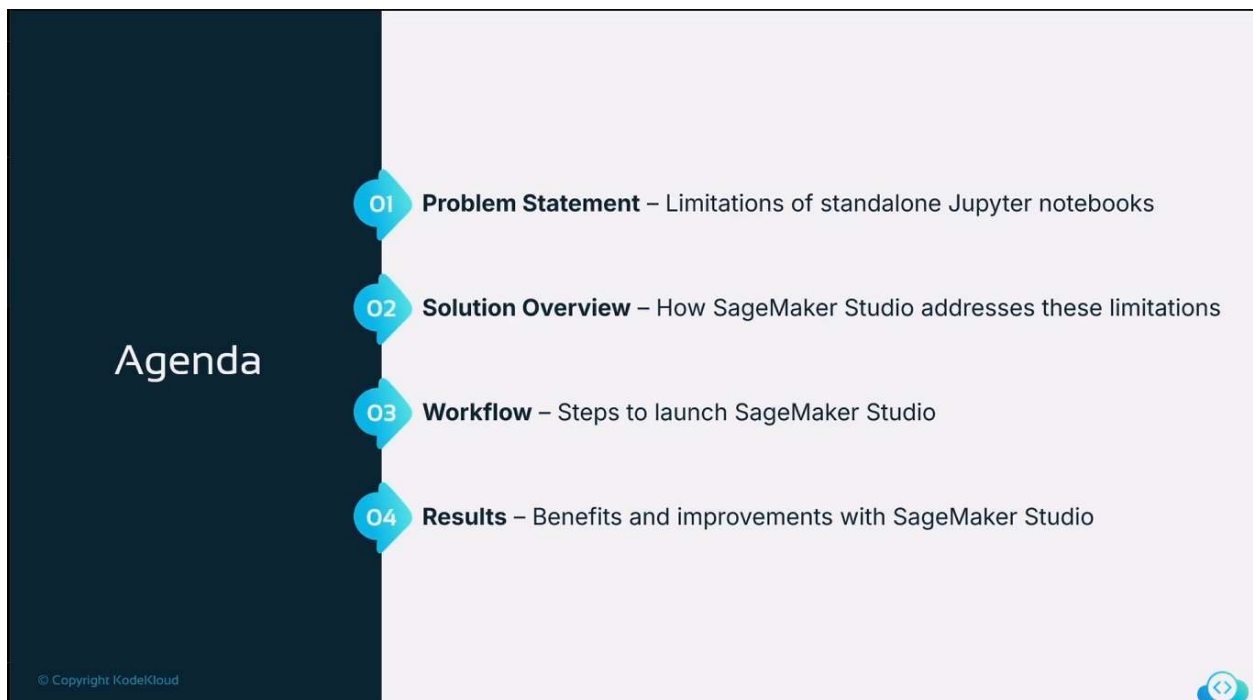
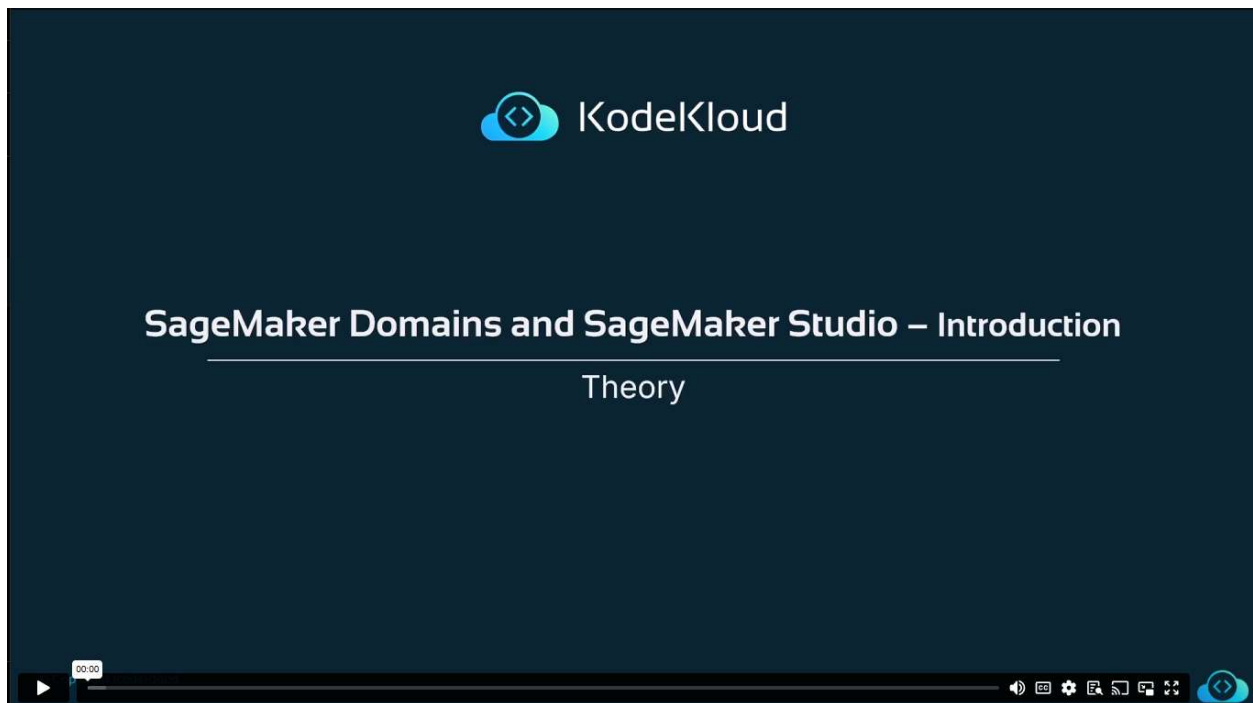
00:20:46 Speaker 2

Is what apps can I access Now most of the time the app that you will be going to access will be the Sagemaker Studio, but there are other options there such as Spaces, Profiler, Tensorboard, and Canvas and we'll be talking more about them later on for now, this is our way in to the Sagemaker Studio. Now following clicking that link, what will happen is I will get a new browser window opening up and that new browser window will.



00:21:15 Speaker 2

Will be pointing at a URL that will give me Sagemaker Studio. You can see in the URL that I'll have Studio and then I'll have a unique identifier and then I'll have the region dot sagemaker dot AWS. So this is a different URL from where the management console is being delivered to you always at studio dot region dot sagemaker dot AWS.



## Problem: Jupyter Instances Limited



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## Problem: Jupyter Instances Limited



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## Problem: Jupyter Instances Limited

Do you have the hyperparameters from your best attempt three iterations ago?



Uh... probably not...

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## Problem: Jupyter Instances Limited

Track experiments systematically

01

Record inputs and outputs

02

Review and select the best solution

03

Third-party tools add to cost (e.g., CometML)

04



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## Solution: SageMaker Domain and Studio

### Domain

**Elastic File System (EFS)** – Shared storage (NFS v4)

**User Profile** – Individual workspace

### Applications

**SageMaker Studio** – ML development environment

**Canvas** – No-code ML

### Execution Role

**IAM Role** – Manages permissions



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## Solution: SageMaker Domain and Studio

04

### Experiment Tracking

SageMaker  
Experiments logs ML  
training runs

05

### Automated Workflows

Collaborate using  
SageMaker Pipelines

06

### Fine-Grained Access

IAM policies manage  
permissions for  
notebooks, datasets,  
and models

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# Solution: SageMaker Domain and Studio

## SageMaker Domain

Acts as an administrative boundary for SageMaker Studio

## Elastic File System (EFS)

Provides a shared filesystem for seamless collaboration

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# Workflow: SageMaker Studio

The screenshot shows the Amazon SageMaker Studio console. At the top, there's a navigation bar with various AWS services and a search bar. Below this, a yellow banner contains a warning about JupyterLab 3 notebooks on SageMaker Studio Classic reaching end of support on December 31, 2024. The main content area features the 'SageMaker Studio' heading, a description of it as a fully integrated development environment (IDE) for machine learning, and a 'Get Started' button. To the left, a sidebar menu lists various options like 'Getting started', 'Applications and IDEs', 'Admin configurations', and 'Ground Truth'. Below the main heading, there are sections for 'How it works', 'What is Studio?', and 'Pricing (US)'.

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13:45



# Workflow: Creating a Domain

[Amazon SageMaker AI](#) > Set up SageMaker Domain

## Set up SageMaker Domain

Use SageMaker Domain as the central store to manage the configuration of SageMaker for your organization.

### Set up for single user (Quick setup)

Let Amazon SageMaker configure your account, and set up permissions for your SageMaker Domain.

- ☒ New IAM role with AmazonSageMakerFullAccess policy
- ☒ Public internet access, and standard encryption
- ☒ SageMaker Studio - New, and SageMaker Studio Classic integrations
- ☒ Shareable SageMaker Studio Notebooks
- ☒ SageMaker Canvas
- ☒ IAM Authentication

Perfect for single user domains and first time users looking to get started with SageMaker.

[Other domain setup options](#)

### Set up for organizations

Control all aspects of account configuration, including permissions, integrations, and encryption.

- ☒ Advanced network security, and data encryption
- ☒ SageMaker Studio - New, SageMaker Studio Classic, RStudio, and Code Editor Based on Code-OSS, Visual Studio Code Open Source integrations
- ☒ SageMaker Studio Projects, and Jumpstart
- ☒ SageMaker Canvas, and Amazon services integrations
- ☒ IAM, or IAM Identity Center (successor to AWS SSO)

Better for admins with large user groups, but you can always update your account configuration settings later if you want to do a quick setup now.

[Set up](#)

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# Workflow: Creating a Domain

### Set up for single user (Quick setup)

Let Amazon SageMaker configure your account, and set up permissions for your SageMaker Domain.

- ☒ New IAM role with AmazonSageMakerFullAccess policy
- ☒ Public internet access, and standard encryption
- ☒ SageMaker Studio - New, and SageMaker Studio Classic integrations
- ☒ Shareable SageMaker Studio Notebooks
- ☒ SageMaker Canvas
- ☒ IAM Authentication

Perfect for single user domains and first time users looking to get started with SageMaker.

Best for testing, initial exploration, and learning SageMaker Studio

Uses the region's default VPC, which may not meet security standards

Suitable for personal development, quick proof of concepts, and non-production workloads

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# Workflow: Creating a Domain

## Manual Setup Considerations

Security & Access Control	Infrastructure & Resources	Integration & Compliance
<ul style="list-style-type: none"><li>• Custom IAM roles and permissions</li><li>• Specific VPC configurations and security groups</li><li>• Custom encryption settings (KMS keys)</li><li>• Specific network access controls (VPC-only vs public internet)</li><li>• Custom authentication methods (SAML)</li><li>• Specific IAM policies</li><li>• Custom security controls</li></ul>	<ul style="list-style-type: none"><li>• Custom EBS volume sizes</li><li>• Specific subnet configurations</li><li>• Fine-grained security group rules</li><li>• Custom domain execution roles</li><li>• Specific app settings and permissions</li><li>• Data encryption requirements</li><li>• Network isolation needs</li><li>• Manual setup allows using existing VPC infrastructure</li><li>• Better control over resource allocation</li></ul>	<ul style="list-style-type: none"><li>• Custom VPC endpoints</li><li>• Specific network routing</li><li>• Integration with existing enterprise systems</li><li>• Custom repository configurations</li><li>• Audit requirements</li></ul>



# Workflow: Creating a Domain

## When to Choose Manual Setup

- |    |  |    |  |
|----|--|----|--|
| 01 | Precise control over security settings   | 04 | Cost optimization for production deployments |
| 02 | Integration with existing infrastructure | 05 | Custom network configurations                |
| 03 | Compliance with organizational policies  | 06 | Specific authentication methods              |



# Workflow: SageMaker Domain

The screenshot shows the Amazon SageMaker Studio console. A yellow banner at the top states: "JupyterLab 3 notebooks on SageMaker Studio Classic will reach end of support on December 31, 2024, (13 days, 12 hours, 59 minutes). We will automatically migrate all accounts to the new Studio experience, featuring JupyterLab 4-based notebooks, in phased rollouts before this date. You can manually migrate to the new Studio before this date and take advantage of the updated features. Your EFS data will automatically be available in the new Studio." The main heading is "SageMaker Studio" with the subtitle "The first fully integrated development environment (IDE) for machine learning." Below this is a "Get Started" section with a "Select user profile" dropdown menu showing "default-20241216T134617" and an "Open Studio" button. The left sidebar shows navigation options: "Applications and IDEs" (Studio, Canvas, RStudio, TensorBoard, Profiler, Notebooks, Partner AI Apps) and "Admin configurations" (Domains, Role manager, Images, Lifecycle configurations). The "Domains" option is highlighted with a red box. The "How it works" section includes "What is Studio?" and "Pricing (US)".

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# Workflow: SageMaker Domain

The screenshot shows the Amazon SageMaker Studio console with the "Domains" page selected. A yellow banner at the top is the same as in the previous screenshot. Below the banner, a message states: "Introducing domain-level resource visibility. SageMaker now allows you to view running applications, jobs and endpoints in the domain to help you monitor and manage cost. Try selecting a domain from the table below, or view the 'Resources' tab on a domain details page." The "Domains" section includes a description: "In SageMaker AI, a domain is an environment for your team to access SageMaker resources. A domain consists of a list of authorized users and users within a domain can share notebook files and other artifacts with each other. One account can have either one or multiple domains." Below this is a "Domains (1)" table with a search bar and a "Create domain" button. The table has columns: Name, Id, Status, Created on, and Modified on. One domain is listed: "QuickSetupDomain-20241216T134617" with status "InService". The "Name" column is highlighted with a red dashed box.

Name	Id	Status	Created on	Modified on
QuickSetupDomain-20241216T134617	d-vvix2hczurak	InService	Dec 16, 2024 13:46 UTC	Dec 16, 2024 13:49 UTC

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# Workflow: SageMaker Domain

Amazon SageMaker AI > Domains > Domain: QuickSetupDomain-20241216T134617

## QuickSetupDomain-20241216T134617

Domain details

Configure and manage the domain.

Domain settings | User profiles | Space management | App Configurations | Environment | Resources

### General settings info

Name	QuickSetupDomain-20241216T134617	Status	Ready	Domain ID	d-vxio2thzurak
Created	Mon Dec 16 2024 13:46:34 GMT+0000 (Greenwich Mean Time)	Last modified	Mon Dec 16 2024 13:49:25 GMT+0000 (Greenwich Mean Time)	VPC	vpc-fe9f9e97

### Domain rules

Visibility of instance and image resources for this domain

Manage rules

Rule type	Application type	Rule action	Resource
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# Workflow: User Profiles

Amazon SageMaker AI > Domains > Domain: QuickSetupDomain-20241216T134617

## QuickSetupDomain-20241216T134617

Domain details

Configure and manage the domain.

Domain settings | User profiles | Space management | App Configurations | Environment | Resources

### User profiles info

A user profile represents a single user within a domain. It is the main way to reference a user for the purposes of sharing, reporting, and other user-oriented features.

Search users

Name	Modified on	Created on
default-20241216T134617	Dec 16, 2024 22:49 UTC	Dec 16, 2024 22:49 UTC

Personal apps

- Studio
- Canvas
- TensorBoard
- Profiler

Collaborative

- Spaces

Launch

## Workflow: User Profiles



studio-d-vxio2thzurak.studio.eu-central-1.sagemaker.aws



URL differs from the AWS  
Management Console



Hosted at  
**studio.<region>.sagemaker.aws**

