AWS CLOUD DESIGN PATTERNS



Useful for building highly reliable, scalable, secure applications and services within the cloud, Cloud Design Patterns (CDP) are defined by experts in the Cloud Computing industry as " general reusable solution to commonly occurring problems in cloud architecting." Seemingly a broad definition, it may help to understand that CPDs are multiple, not one-size-fits-all. Considering that CDPs are used to solve "common problems", it can be said that altogether these patterns are a library of reusable solutions to unique or individual issues that many cloud builders encounter.

In this post, we will discuss CDPs in more detail. Also, in efforts to help with Amazon Web Service architecture, while exploring what design patterns are and how to use them, we will take a look at AWS CDPs and the future of AWS design technologies.

A broad overview of what a CDP entails

Much like laying a tiled floor with care for pattern and design, building cloud applications requires each row (level) to be laid out (coded) perfectly before the next. If the bottom level is unstable, the preceding levels will be unstable too. Just imagine laying a floor without caring about what each tile looked like, it would probably end up quite poorly. When designing a cloud application, an engineer is always carefully watching out for issues. As general issues arise, the engineer looks to solve them reliably and securely with a proven solution. CDPs save time and possible messy outcomes for everyone.

Generally coming in a standard format, here is what you will find in a single Cloud Design Pattern:

- Pattern name and a short description
- Identification of the typical issue and challenges
- An outline of solving the problem in the cloud
- The benefits that come from pattern application
- Any extra notes including advantages, disadvantages, note explanations
- Anything else the architect cares to add

Why use CDPs?

Beyond simply using patterns to boost cloud architecture to easily migrate and rapidly develop highly scalable applications, there are a few other benefits to this library of solutions. Large enterprises, as well as startups, are using CDPs to unlock incredible value on a large scale. Working to ensure 100% repeatable results across the entire lifecycle of a platform and to remove the maintenance of deployed applications, overall patterns of frustration of running a cloud system are reduced while productivity is increased.

On top of system-level benefits, architects experience advantages from CDPs too. Imagine that while you are working on an AWS application, you run into a problem while increasing the efficiency of internet storage. You describe the problem to another architect and she responds, "The storage index pattern will work for that." Knowing the name of the pattern, you get right to work. This is a language used to easily communicate and fix issues. Having a clear idea of all the cloud applications before beginning any project, with the help of CDPs there is no need to start from scratch when creating a software system.

What are AWS CDPs?

As Amazon is one of the big three in the Cloud Computing industry along with Google and Microsoft, it will come as no shock that, with all of its components, AWS has a set of CDPs. Although not officially listed with any specific reference by AWS, the patterns for AWS were unofficially designed by three Amazon architects. Leaving details of each AWS CDP on a Wiki, beyond this resource it is good to note that most CDPs are pretty interchangeable for varying cloud services. The names for each CDP may be different, however, with the above-mentioned standard details, the description of the pattern will include how to solve it in AWS or the specific cloud service.

Top AWS Basic Patterns

- Snapshot Pattern (data backups) - Ensuring that data is safe, this pattern is ideal for when performing program update checks that require data cross-sections and the coping of OS as well as data. Allowing a 'snapshot' to be taken, when used copies of each OS will be taken.
- Stamp Pattern (server replication) - Reducing the labor, time, and expense it takes to set up a virtual server, this pattern essentially copies the virtual server with functions already set up to go. It is great for creating large amounts of virtual servers.
- Scale-Up Pattern (dynamic server spec up/down) - This pattern allows builders to adjust the server specifications for usage without replacing the server and reinstalling the operating system.
- Scale-Out Pattern (dynamically increasing the number of servers) - Match unexpected variations in traffic volume without increasing cost for a high specification in a high-spec server.

This pattern makes “scaling up” to change the number of virtual servers that handle processing easier.
- On-demand Dish Pattern (dynamically increasing/decreasing disk capacity) - Stop making elaborate disk capacity estimates before building and cut costs on up-front hardware investment. The installment of virtual disks with this pattern provides unlimited capacity.

AWS Pattern Categories

Along with the five basic and most used AWS CDPs, each area of the following cloud application also has multiple pattern solutions:

- High Availability
- Processing Dynamic Content
- Processing Static Content
- Uploading Data
- Relational Database
- Batch Processing
- Operation and Maintenance
- Network

Lambda and the future of AWS CDP

As the technologies in cloud services grow and innovations are implemented, it is possible for CDPs to not apply anymore. On top of that, in the near future, they may not even be needed thanks to technology like Lambda by AWS. As a serverless computing platform, “it is a computing service that runs code in response to events and automatically manages the computing resources required by that code.” Meaning that Lambda can fix certain cloud design problems without the attention of a cloud architect. Although it does not currently solve all CDP issues, there is a chance that soon event-driven architecture will replace manually activated solutions.

No matter where the future leads for CDP, one thing is for sure, the expansion and growth of cloud services is inevitable. Currently, to handle this growth, AWS has a service called Cloud Pattern Studio. Essentially a template feature where solutions in a pattern are combined with Cloud Formation and then input into a template, it is designed to visually design and deploy environment software stacks on AWS.

If you are thinking about moving to the cloud or already run your organization on the cloud, understanding how to run cloud-based workloads and unlocking the true power of a platform will save money and effort in the long run. Leveraging well-known patterns to solve the problems that builders encountered while running cloud software is highly valuable in this evolving age.