**"Kubernetes is a portable, extensible open-source platform for managing containerized workloads and services, that facilitates both declarative configuration and automation[1]"**

Wait…, what?  If you are new to containers and orchestration, this intro will provide you with a basic understanding of how this technology could help manage your applications.

## What does it mean?

Using a beach side hotel analogy, we expect seasonal traffic with high demand in summer, but not so much in winter. The hotel manager represents Kubernetes, orchestrating room availability during these times of variable demand. The hotel's physical infrastructure of buildings are Nodes, while each room is a Pod. Lastly, Containers are located within each Pod, so in this case, a hotel suite's separate bedroom, bathroom, or office area.

The Kubernetes manager accommodates scaling and consistency, whether it's peak summer, or the off-season. She makes sure there are no empty rooms there using up resources unnecessarily. This results in more efficient use of resources, so that rooms are not sitting idle if there are no guests. Now let's take a 10,000-foot view of container orchestration, in action.

It's the last week of summer, and you have the whole family (and your parents) packed up and ready to head to the beach.  You arrive at the Seabreeze Inn, but when you speak to the agent at the front desk, there is only one room available.  As much as you love your parents, you *need a separate room!  What do* you do?

Lucky for you, the hotel manager happens to be an expert in customer service (in this case, Kubernetes). She quickly gets to work!  The Seabreeze Inn has recently been renovated to use the newest modular technologies.  With a few quick commands, the Manager can see that there is vacancy in the building (the Node) for another hotel room (a Pod).  The manager directs the modular room, or Pod, to be created based off a template that specifies how many beds and bathrooms (i.e. containers) are needed, with all the plumbing and electrical already configured to plug into the main building.  The room is ready in just seconds, so you don't have to spend the night on the pull-out bed!

Now that you're all set up in your respective rooms, your family heads to the fireworks the next night. Suddenly, one of the embers lands on a hotel nearby and starts a small fire.  Everyone at that hotel is safe, but all the guests now converge on the Seabreeze Inn looking for rooms.  The fearless Manager says, "no problem!"  She has been instructed by her management (deployment instructions), that if there is demand, she can build up to three hotels (replica limit).  Her construction staff (master node) has been monitoring the influx of people, and automatically begins to build a new building (node) and populate it with the correct number of rooms (pods) and beds (containers) to meet the demand.

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[1] https://kubernetes.io/docs/concepts/overview/what-is-kubernetes/

The next day, while everyone is out enjoying the beach, the maintenance staff (health checks) notice a water leak in one of the buildings.  They're able to immediately stand up a new building, move everyone's items, and shut down the old building for repairs.  The cleaning crew (rolling updates) also comes by each building, but you are not stuck standing in the hallway waiting for them, as they can move your room (pod) to another building (node) whenever necessary.

All the patrons of the Seabreeze enjoyed the last week of summer, but it is now time to go back home.  As the final guests leave, the wily hotel manager can immediately scale the Inn back to just one building and one room for the off-season.

*Benefits of Kubernetes*
*- Instantaneous Scaling*
*- Streamlined CI/CD*
*- Efficient use of human and capital resources*

## What does it mean to me?
So that was a very simplistic view of containers and orchestration, but let's go back to the original definition and apply what we learned.

"Kubernetes is a portable, extensible open-source platform for managing containerized workloads and services, that facilitates both declarative configuration and automation."

In this statement, the hotel manager is the "platform for managing workloads and services."  She was able to coordinate all the moving parts seamlessly based on prior instructions and templates.  The "workloads" in this case were creating the building, setting up rooms, and providing beds and bathrooms on demand (and scaling them back down) for the varying stream of customers.

Applications in your environment may go through similar periods of high traffic (special events, natural disasters) where you need the ability to burst performance to fulfil your goal of supporting the public.  Provisioning extra servers and VMs in anticipation of a surge is not an efficient use of human resources (time spent to set up new servers, apply security controls, load and test the application) or capital resources, such as purchasing new hardware, supplying additional power and cooling to your datacenter.

Utilizing a container-based system with Kubernetes will also help your Continuous Integration/Continuous Development (CI/CD) process.  The container templates used in the development environment are the same that are used in staging and production, so you don't have to hear "it worked in development!"

Using an open source tool like Kubernetes in combination with a Cloud Service Provider (e.g. Google Cloud Platform), will allow your DevOps shop to not worry about provisioning and scaling, but instead focus on continually improving the service you are providing to the public.  Since the containers are open source, you are also not locked into a specific cloud provider and could therefore support a hybrid cloud strategy if that is what your agency calls for.

**Go from "pay for what you provision" to "pay for what you use"!**

OnPoint is looking at ways to utilize the strengths of Kubernetes and infrastructure as code to create robust and consistent DevOps environments; saving our customers time and money.  For more information about Kubernetes, or to start your journey, contact OnPoint at innovation@onpointcorp.com

## About OnPoint

OnPoint Consulting, Inc. (OnPoint) delivers secure IT infrastructure, enterprise systems, cybersecurity and program management solutions for the U.S. federal government. Our specialized strategy, cyber and technology capabilities are changing the way our clients improve performance, effectively deliver results and manage risk. OnPoint holds ISO 9001:2008, ISO 20000-1:2011, ISO 27001:2013 certifications and a CMMI Maturity Level 3 rating.

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