USU

White Paper

Container Monitoring

Providing, orchestrating, and effectively monitoring microservices

Contents

Introduction

Containers are considered one of the biggest trends with IT managers. They have hit a nerve in the agile IT world and have immensely simplified handling with complex server applications. Especially in data centers, a high level of automation can be attained – from development to provision and the roll out of applications. What's more, is that this new key technology makes IT applications platform-independent. In particular, this helps the provision of scalable, distributed applications within the cloud or modern multi-cloud environments.

Nevertheless, the increasing popularity of IT containers as the basis of current IT concepts also causes headaches among IT administrators. Further, they have to effectively monitor modern container technology to ensure smooth operation, optimal performance, and high availability of container applications in their companies.

Before deploying IT containers, a few points need to be kept in mind since new technology essentially draws on technical and organizational adaptations. For example, this means integrated container monitoring must be guaranteed with traditional system monitoring.

In this compact whitepaper, you will learn how companies effectively get to grips with the high-level complexity of container orchestrating by using special container monitoring solutions while increasing performance and reliability at the same time in this area.

IT Containers simply explained

The container can no longer be imagined as a universal and standardized transport container from global transport business in this day and age. It has revolutionized logistics and allows goods of any kind to be sent and distributed quickly and flexibly in a standardized “package”.

At the same time, it does not matter on which means of transport a container is used. No matter if by ship, freight train, plane, or truck, standardized containers are compatible with every transport platform.

Containers operate in a similar way in IT. Applications and all files required to execute them are compressed into a manageable container package. This divided unit can then be distributed and executed no matter where it is and independent of platform from each other.

Definition

“Containers are a standardized unit of software, which allows developers to isolate their app from their environment.“

(Source: www.docker.com/why-docker)

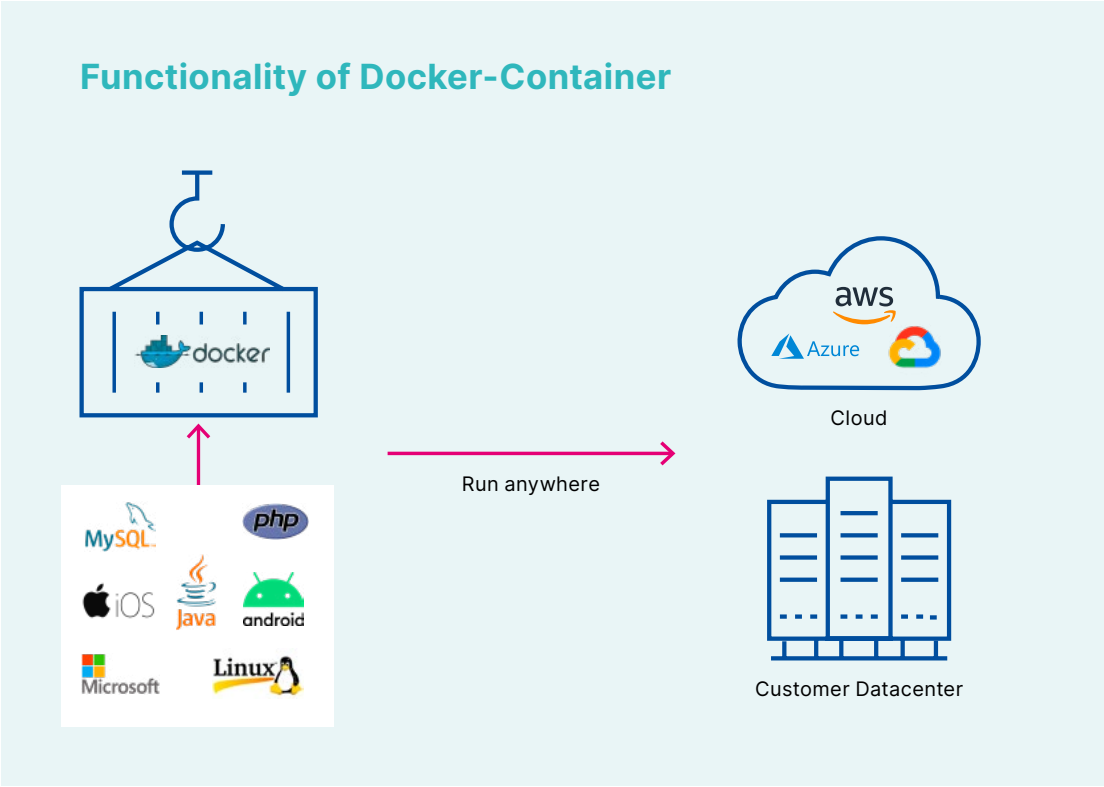
A very simple comparison: Imagine that you had your job in a cargo container. It makes no difference for you whether the container is now in Berlin, New York, or Singapore. You have the same internal conditions in your office container at any location in which you can handle your work. The same also applies for applications like php, mysql and Apache in a software container. It does not matter to you which platform they are on. Your applications can be started inside the container.

Especially among administrators and developers, new technology is enjoying high popularity since containers do not have a separate operating system compared to virtual machines (VMs). This means that they are significantly more efficient and resource sparing. They require less CPU and memory and can be portably executed as a closed application package on different systems. In this way, they help in the installation and operation of complex server applications – recently in multi-cloud scenarios – and in their management and distribution. Another benefit is high scalability: hundreds of containers can be started up and shut down within seconds.

Correctly orchestrating containers: Docker, Kubernetes und Co.

Today the transition of companies to digital players is driven by software. IT departments must react to changing demands and develop or provide new applications for the digital transformation. The use of containers is ideally suitable for this. The most well-known container technology is now Docker.

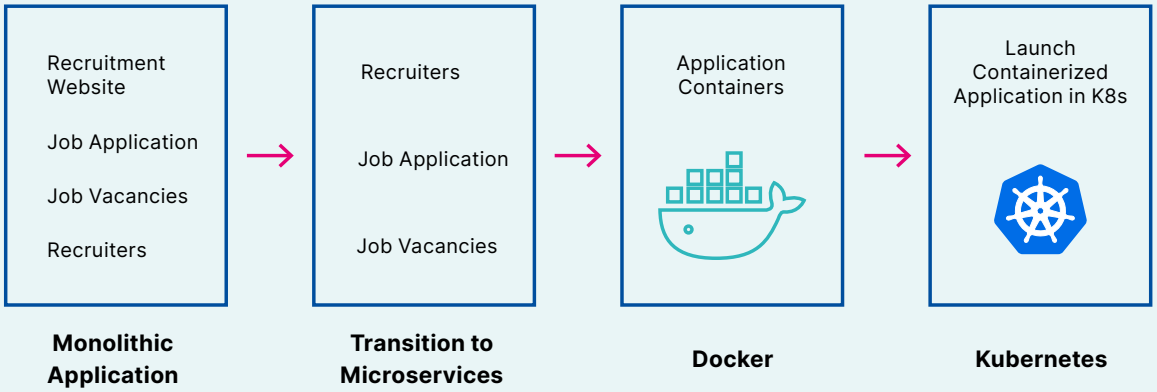
Docker has revolutionized this method and runtimes can be developed in recent years in addition to the most popular containers. It refers to an open-source container virtualization technology whose container can be executed anywhere – locally (on-premise) in the company's own data center or with an external service provider also in the cloud.



Monolithic systems are now being replaced everywhere with the help of Docker containers, which were developed before the cloud era, by small independent microservices since developing and providing software applications more quickly – and those with concurrent low resource consumption.

Containers alone are not enough to efficiently move programs into production. Just when applications become large and complex, appropriate orchestration is also required, and independent applications are executed in a container – regardless of whether the container is located in the cloud or also locally in your own data center. This poses new challenges in IT departments because whoever works on an enormous number of containers, has to be able to also efficiently manage these over various environments. At this point, Kubernetes closed a decisive niche market for container orchestration. Kubernetes is a container management tool that automates the provision of Docker containers. The software, launched in 2015, was originally designed and developed by Google. Shortly afterwards, Google donated the project as open source software to the newly founded Cloud Native Computing Foundation, which now includes almost all the major cloud players, such as Azure (Microsoft), aws (Amazon), Google Cloud (Google), Bluemix (IBM) and Openshift (Red Hat). In this way, container orchestration is supported by all leading cloud platforms these days using Kubernetes. Essentially, the software ensures provision and management of a container environment and handles the respective control of resources, guarantees availability of applications, and aids in the full utilization of containers. This offers some benefits. Due to new flexibility, the containers, and their orchestration with Kubernetes, a company's IT departments or development teams can work with more agility and more independently and consequently, they can roll out new functions, services, and fixes – all with no downtime. At the time, the software takes over planning and ensures optimal package density for different container-based applications and thus for more efficient utilization of resources – recently in multi-cloud environments or on virtual machines in separate data centers. As a result, costs and personnel expenditures are significantly lowered as well.

Container orchestrating with Kubernetes



Why Container-Monitoring?

Where extensive containers are used, it is sensible to use an appropriate container monitoring tool to ensure smooth operation at any time. If an administrator is monitoring, they should know to what extent, the container

can utilize host resources and to what extent the containerized services are also available to the user. At the same time, monitoring containers do not greatly differ in theory from the monitoring of traditional IT system infrastructures. In both cases, the metrics, protocols, service determinations, and status checks are necessary for monitoring.

Due to the dynamic and complex structure of the new container technology however, monitoring is noticeably more complex. In this way, performance and availability of all applications in a container must be checked, like their CPU and memory usage.

USU Container Monitoring Dashboard

With Container Monitoring, it is not only a matter of monitoring of individual containers but also understanding all processes running in the background. In order to get a complete overview, a series of items must be maintained in parallel view. On the one hand, the containers themselves, but also the respective cloud platforms, the individual services and also the Kubernetes environment, in order to obtain information about failed starts or pod restarts, for example. Only this holistic approach provides an administrator with all important information about the state of the entire container environment, and only in this way does a container monitor contribute to high availability and flawless performance of all container applications. Yet, these tasks can hardly be managed using a traditional monitoring approach.

Anyone planning or running a large environment with Docker containers should therefore look at the specially adapted container monitoring tools on the market. If an IT department is already using a commercial IT monitoring solution for monitoring a regular system infrastructure, this can also be expanded to a container monitoring system with plugins. In this case, the admin for the container technology does not need any additional monitoring software and can see all information transparently in a new tool and on a dashboard. Simultaneously, they can also use existing and trusted features such as alarm management.

How a corresponding dashboard of a container monitoring solution can look in detail is shown in the figure “Container Monitoring dashboard of USU.” In this example, the solution is linked to the Kubernetes orchestration tool. Using an integrated auto-discovery function, containers or pods and nodes are automatically detected and monitored. It does not matter if the Docker environment is operated in the cloud or on-premises. Thus, the administrator gets an overview of the availability and detailed status of nodes and containers or pods in real-time. At the same time however, overviews on relevant figures such as CPU load, memory use, hard drives and network IO of the container and current alarms in the container environment can be retrieved at any time.

How you monitor your containers and micro-services with the USU container monitoring solution and what benefits the USU IT monitoring provides for you can be found in this Flyer.

Summary

These days, containerization is the most important radical change in the IT world since the introduction of hardware virtualization with virtual machines. Docker containers are very high up the list with companies when it comes to digitalization strategies focusing on IT architecture. Resource-saving container points in particular as they are much more compact and smaller in comparison to virtual machines. Application technology has also revolutionized the area of software development and brings previously unimagined flexibility and efficiency in the development process to app development. Containers provide a clear use in the IT world in many locations because they are small, simple, efficient and can be simply orchestrated and successfully managed with the appropriate tools like Kubernetes. At the same time, Docker containers and Kubernetes pose a challenge to overseeing the system with monitoring.

This matter of container monitoring is actually as complex, dynamic, and fast-moving as the container. Traditional IT monitoring quickly meets its limits in the case of new, complicated technology. Anywhere where containers are extensively used, orchestration tools are no longer sufficient for smooth operation of containerization applications. Therefore, IT administrators, who must use containers productively, are well advised to deal with this by using the special container monitoring solutions on the market. This is the only way for an administrator to have complete real-time visibility into the state and performance of the containerized environment at all times. The right tools alone – special container monitoring – can ensure high availability and flawless performance of the new container technology in organizations.

About USU

USU is a leading provider of IT monitoring solutions. With USU IT Monitoring, we offer you the solution for holistic monitoring with a high degree of automation. The IT monitoring software assumes the job of monitoring important tasks, the status of your IT infrastructure, and the maintenance of your service levels automatically. This minimizes your administrative costs in IT operations, supports you with optimizing your IT infrastructure and service levels, automates monitoring, and increases reliability of your business-critical services. With over 40 years' experience we'll take you forward into a more successful future.