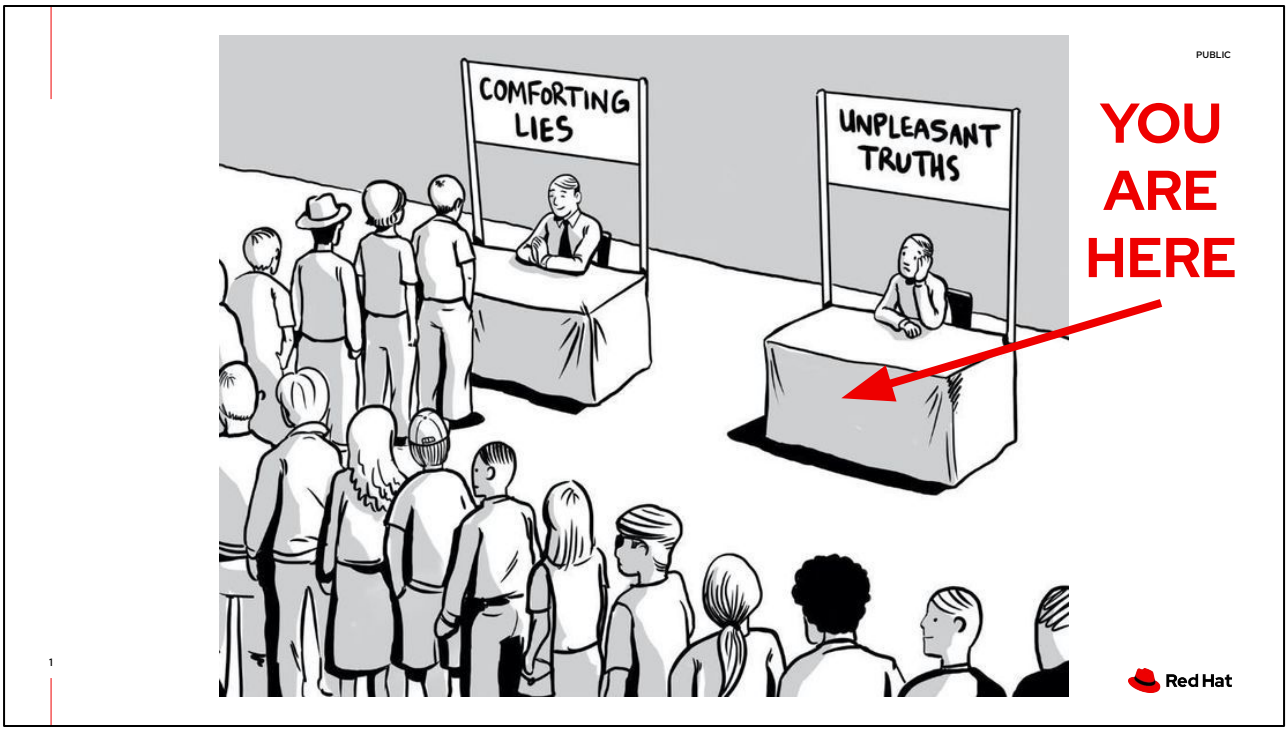

It’s human nature, we all do it. We look for simple and comforting lies we can tell ourselves which help us get through the day without too much stress… I do it, you do it. There is nothing wrong with this honestly. If we didn’t take some shortcuts in our thinking we would be mentally overwhelmed at all times. What we need to remember is that too much of a good thing can be bad. From time to time, we need to peek behind our comforting lies and adjust in order to improve things.

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What Cloud Vendors Won't Tell You

Arm Yourself, And Succeed With Cloud

Deven Phillips
Senior Architect
Cloud-Native Runtimes Practice

Red Hat

PUBLIC

The Cloud Is Not Easy

- Ingress / Egress
- Identity & Access Management
- Monitoring
- Scaling
- Replication
- Backups
- Disaster Recovery
- Diagnostics & Troubleshooting

Red Hat

Almost none of what you do beyond the basics in the cloud is simple. It requires new skills, new ways of thinking, new ways of management. If you are going through the web console on your cloud vendor's web site and manually provisioning resources, you're not going to save costs or complexity.

For organizations adopting public cloud or even hybrid cloud, they fail to recognize that many of their traditional processes are either greatly complicated or impossible apply in the cloud.

Imagine this scenario… Your application is having issues where some requests are getting dropped between different services. In an on-prem environment you might use a network sniffer or a monitor port on switch to check on what is causing the problem… In the public cloud, that's not really possible. Sure, you can run a sniffer on hosts, but not at the interconnect. Also, you cannot sniff managed services like databases or across VPC boundaries.

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Cloud Can Evolve Toward Being Easier (over time)

- Automation
- Elastic scaling
- Monitoring
- Using hybrid cloud technologies can help (e.g. Kubernetes)

5

Red Hat

The skills to be successful in the cloud are things that you can develop and train for, but they don't happen overnight. They also are in high demand, so you need to pay competitive rates and provide a satisfying work environment. You also need to ensure that you are aligning your staff to your vision while incentivising them to do the right things for your business needs. Perhaps you should be paying bonuses based on how efficiently your staff are running their systems. Find proper KPIs like the Accelerate Metrics and the 3 Key metrics of Reduce Costs, Increase Revenue, and Increase Retention of customers.

Definitely consider how you can re-architect/refactor your applications and services to allow for elasticity. When demand is low, set your systems up to reduce your cloud spend and choose technologies which will let you scale when needed. That doesn't mean to rewrite everything in Go or Rust because very few organizations experience massive spikes in demand, they're usually more gradual. Model your environment based on your workloads and don't try to be XXXX FAANG company.

In the cloud, if you have people manually provisioning, then you are going to need to adopt more automation. That could be Terraform, CDK, Ansible, Puppet, Chef, Salt, etc… If you're adopting Kubernetes, definitely look at Helm and/or Kustomize in conjunction with a CD tool like Argo.

Using Kubernetes with Operators can provide a consistent and simplified experience which can allow you to gain improvements on-prem and in the cloud. Using K8s as the abstraction layer over all of your compute can lead to a unified and clear

configuration across all of your enterprise.

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The Cloud Is Not Cheaper (unless you're very good)

On-Prem/Colocation

- Real Estate
- Power
- Cooling
- Security
- Facilities
- Water
- Hardware

Public Cloud

- Compute
- Storage
- Managed Services
- Backup
- Disaster Recovery
- Bandwidth
- Monitoring

Red Hat

The cloud vendors bake all of those costs you have into their prices and services. The difference is that they can achieve some economies of scale. The differences are not as vast as you might imagine though. There is a significant margin included because, just like for your organization, there is variability in supporting costs for power, cooling, etc… As a rough estimate, you can probably estimate that the costs of running a single VM on-prem is comparable to running 2 or 3 VMs in the cloud. And many cloud proponents would shout "That's a HUGE savings" and if you could relate them 1-to-1 it would be. The issue is that there are always considerations which go with those numbers:

1. To achieve similar reliability, you often have to deploy replicas in other availability zones or even other regions, and thus it's likely a 2-to-1 conversion rate at a minimum
2. Using managed services can increase costs while possibly reducing some staffing needs, but not the highly skilled staff (think DBAs and Developers and Security)
3. The bandwidth costs for interconnect between AZs and Regions are significantly higher than those for on-prem and they can very unpredictable based on demand. Unpredictable bills can be a serious problem

If you really want to save money in the cloud, you need to take full advantage of elastic scalability to reduce your spend when demand is lower and only increase it when needed. This requires much more complex application design and architecture. It also requires highly skilled IT staff to implement, monitor, and manage your now more complex infrastructure.

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(If you're very good) The Cloud Gets Cheaper

- Use small instances
- Architect for elastic scalability
- Use monitoring to grow and shrink your footprint
- Choose managed services which improve your bottom line
- Don't chase after fads
- Use easily swappable components

Red Hat

If you can architect for a small number of redundant services across AZs and/or Regions, if you can configure your cloud monitoring and elastic scalability to quickly adjust to demand and scale back when it subsides, if you can minimize your transit/interconnect bandwidth costs, if you can choose the right managed services which scale their costs and capabilities to match your business, if you can automate managed and off-site backups, and if you can employ and keep the qualified staff needed to run all of that, you MIGHT be able to save money in the cloud. That's a LOT of IFs, and in general you could be considered wildly successful if you could match your legacy datacenter costs in the cloud. That alone would be a huge win as now you are not tied to hardware leases, refreshes, etc… The cloud is constantly getting upgrades and evolving to faster/better/cheaper, so optimize as best you can!

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The Cloud Is Not Necessary (for everyone)

- Automation
- Infrastructure-as-Code
- Monitoring
- API Gateways
- Pipelines

Red Hat

It's not a simple as that. When you're configuring your on-prem environment you have intelligent and thoughtful people putting things together, so they will often see and fix small issues as they go based on experience and the direct interaction with the systems.

In the cloud, you have to feed extremely detailed specifications into their systems in order for the correct outcomes to be achieved. And you might say something like "It only takes me a minute or two to create a VM and expose it to the Internet." That's very true for one-off servers/VMs, but at scale for an actual enterprise you cannot afford to pay people to configure and provision each and every VM or instance.

Beyond that, for organizations with stable resource use, the costs and complexity associated with the cloud is more than they can easily recoup. If your compute resources are relatively stable over the span of 2 or 3 years, you're unlikely to get a good return on an investment toward cloud migration.

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On-Prem Can Be Cheap & Effective

- Kubernetes is one option to improve density and reliability
- The same techniques used in public cloud can be effective on-prem
- The well understood fixed costs can be better than unexpected ballooning costs
- Automation and Infrastructure-as-Code allows for improved reliability and decreased costs

Red Hat

If you are looking to improve your bottom line without a lot of the complexity of a cloud migration, you can leverage a Kubernetes platform on top of your existing infrastructure. This can allow you to get a lot of the benefits of the public cloud (elastic scale, better resilience, self-healing, etc…) in your existing datacenter/server room.

Additionally, fixed infra with well understood costs can be very beneficial to organizations which cannot easily absorb wild fluctuations in cloud costs. Instead of getting a huge spike in bandwidth costs in the cloud, your users/customers just experience some delays in accessing your services. That's a lot better than an existentially threatening cloud bill. Same with storage and managed services.

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The Cloud Doesn't Magically Accelerate Time To Value

- Managed services need refactoring of code to integrate
- Choosing the right managed services takes forethought
- Changing managed services often requires refactoring again

Red Hat

So many people have been trapped in this quandary… They use a managed service because it's quick and easy to get started with, then as they scale or evolve the managed service becomes cost prohibitive or does not meet their performance needs. Then, they have the problem of refactoring or rewriting large quantities of code to move to a different managed service. This is exactly why standards exist for things like database connectivity or messaging, so that you can swap out the implementation without rewriting your code. Using proprietary APIs for managed services is a pretty good way to end up in a bad situation.

One example is using a managed service for messaging. The cheap and easy path early on is often one of the cloud provider's managed services. The problem with that is there are only proprietary APIs for many of those solutions. So, what starts out relatively cheap and simple eventually becomes a major money pit which is hard to escape from.

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It Is People & Process Which Drive Delivery

- Clear alignment to the overarching goals
- Team autonomy to execute on those goals
- Freedom to experiment to find the right solutions
- Using technologies based on standards is a good thing

Red Hat

Choose services for which you have expertise to use or can develop expertise to use.

Make sure that your delivery teams are clearly aligned to your organizational goals and have the freedom to experiment and determine how best to achieve those goals for their portion of the mix.

Using technologies based on standards is also a good way to ensure you can find qualified and skilled staff to work on those technologies.

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The Cloud Doesn't Solve Your Challenges For You

- Using SaaS offerings does not always eliminate complexity and sometimes introduces more complexity
- Just using Technology X in place of Technology Y does remove problems, it shifts them
- There are no "easy" answers to any modern technology problems, just different way of approaching the problems

Red Hat

Switching from traditional message to Kafka doesn't magically resolve scalability issues. Switching from traditional relational databases to a document database does not automatically make you more resilient or performant. In some ways, trying to adopt technologies like these actually increase complexity without adding value, and that should be the only driver for making a change.

I recently was working with a customer who was trying to replace their traditional JMS implementation with Kafka everywhere. At different times I had teams come to me and ask things like "I need to have guaranteed processing order, how do I do that in Kafka?" or "I need a dead letter queue for these Kafka topics, how do I do that?" The answers to the questions are a subject for another time, but suffice it to say that these are ridiculous questions in relation to Kafka. I've heard similar bad questions about using document databases and other "cloud-native" technologies.

Another customer of mine wanted to use a NoSQL database because it offered a better SLA, but then they needed to go through SO MUCH EFFORT to be able to query their data and implement transactionality. They didn't have scale problems which would have necessitated such a move. For a simple application with 4 tables on-prem, they ended up taking over 12 months to rewrite it for using a document DB and build the infrastructure appropriately.

And just remember, the only easy answers to complex software problems are around choosing a version control system - mostly because someone already made that choice for you.

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Managed Services Can Be A Boon

- Choose based on actual PoCs
- Ignore hype and look for real-world examples
- Choose a managed service that follows common standards
- Do not try to apply your legacy processes to cloud services

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Boring technology is almost always better until you face a problem which boring technology cannot directly solve.

Don’t take the vendor’s word for how simple things will be. Look for other people using the technologies in a similar manner as you might and ask your peers.

Try to stick with standards as much as possible. They’re easy to hire for, easy to swap out, and they’re standards because they work for most use cases.

Do NOT try to use your legacy processes with managed services. You cannot

The Cloud Doesn't Reduce Staffing

(it shifts it)

- Your network staff now become VPC, Interconnect, Cloud Engineers
- Your Security staff become Cloud-Security Engineers and have a much harder job
- Your DevOps/Platform Engineers become Cloud Delivery Engineers and need to learn completely new skills around pipelines, infrastructure-as-code, automation, deployment, monitoring, and scaling.

In general, for every person on staff for your on-prem operations, you will need equal or more people to operate in the cloud, and the skills they need are more complicated. Switching to a managed database engine does not eliminate the need to structure your data appropriately for performance. Switching from physical network devices to software-defined networking requires the same skills and more. Patching and updating OS images and virtual machines and containers still has to happen, and not it needs to happen faster and with better automation in order to realize cost reductions. Really, the only job which goes away are the people who used to physically rack and cable the equipment.

Do Not Reduce Staffing (shift it and train them)

- Your existing staff could be your biggest allies
- Train them incrementally on cloud technologies
- Pay them appropriately as they upskill
- Give them guidance and autonomy, not micromanagement
- Help them automate the tedious and celebrate the innovation

Cloud Costs Could Threaten Your Business

- Poorly managed or monitored services can cause cost overruns
- Poorly tested or constrained Functions can cause massive cost overruns
- A DDoS attack on an improperly configured service could lead to existentially threatening fees and bills

We have all seen or heard horror stories of surprise 5 or 6 figure cloud bills popping up where only hundreds or thousands were expected. I have personally seen 2 businesses fail because of cloud cost overruns, one was a past employer and another was a client. The only guaranteed way to avoid costs exceeding revenue is to architect such that your revenue is directly correlated to cloud spend somehow, and that is not easy or sometimes even possible.

Monitor Cloud Costs Constantly

- If possible, set spending limits. Reduced functionality is better than bankruptcy
- Use cloud monitoring tools and set limits on scale to stay within budget
- Use monitoring and elastic scalability to “turn off” unused services when not needed
- Architect for scalability, not just upward but downward.

In Review

- The Cloud Is Not Necessarily Cheaper
- The Cloud Is Not Necessary For Everyone
- The Cloud Doesn't Magically Accelerate Time To Value
- The Cloud Doesn't Solve Your Challenges For You
- The Cloud Doesn't Reduce Staffing
- Cloud Costs Could Threaten Your Business

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