The Complete Handbook for AWS Reserved Instances

How to Plan, Purchase & Get the Most Saving Power from Your RIs

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Introduction

Reserved Instances (RIs) can save you a lot of money with Amazon Web Services (AWS). Using RIs, our customers routinely save 30% off the On-Demand price. It's enough to make any company sit up and take notice. But there's a catch. While RIs can yield substantial savings, a misstep can erase your hard-won ROI, or even cost you dearly.

At first glance, RIs can seem extremely complicated, but you don't have to be afraid of them. When used correctly, they can be the one of most powerful cost-saving tools Amazon provides. Any company looking to lower their cloud costs should take the time to get truly familiar with RIs.

That's why this eBook is here. We'll walk you through RI basics, show you how they work, help you calculate your RI needs, and show you how to manage your RI portfolio going forward.

Part 1:
The Basics

What is a Reserved Instance?

Despite the name, you're not actually reserving a physical instance when you buy an RI. An RI is coupon that can be applied to a specific instance type. It uses the exact same resources that an On-Demand purchase uses, but at a lower rate.

Have you ever bought a season pass to a theme park or museum? In essence, you get a heavily-discounted rate on admission for a whole year. If you go enough times during that year, you'll save money. Reserved Instances work in a similar fashion with either a one-year or three-year term. You get a discounted rate on instance use for the term of the Reserved Instance, and if you use enough of the right instances, you can save a lot of money.

In their system, AWS classifies RIs as a billing discount applied to your On-Demand use. We'll go more into how that all rolls out below.

Not just for EC2

When people talk about RIs, odds are good they're talking about Amazon EC2. EC2 is the most common AWS service, so it usually has the greatest potential for untapped savings. But it's not the only service with RIs. They can also be purchased for Amazon Relational Database Service (RDS), ElastiCache, Redshift and DynamoDB.

Reserved Instance traits

There are four key attributes for every RI:

Instance type	Broken down by the instance family (e.g. m5) and instance size (e.g. large)
Scope	Whether the RI is flexible within a region or applies to a specific AZ (e.g. us-east-1a)
Platform	Which operating system will be used (e.g. Linux), since some features are only available for certain platforms
Tenancy	Determines if the RI runs on Default (shared) or Dedicated hardware

RIs are categorized by the combination of all four attributes, such as an m5.xlarge Amazon Linux, default tenancy instance in us-east-1b. When you run an instance with the same attributes as an RI, the discounted rate is applied to your usage.

Regions and availability zones

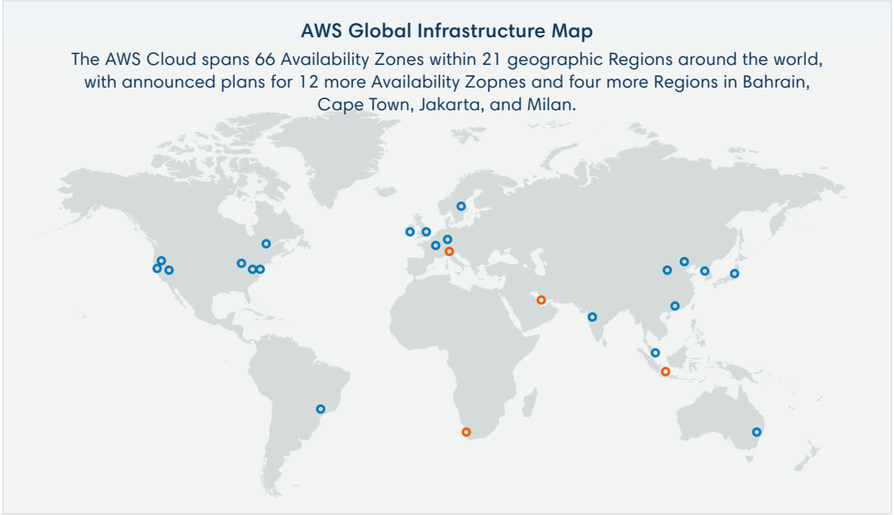
AWS divides its services across several different geographical areas called Regions. Each one of those is further broken down into two or more Availability Zones (AZs). Any instance can be identified by both its Region and AZ, such as us-east-1b. This is known as its scope. When you purchase an RI, you have a couple of options for scope. If you select the Region scope, then your RI can apply to an instance in any AZ within that Region. If you select a specific AZ, then the RI will only apply to instances in that AZ. But what are the benefits of each option?

Availability zone

By specifying an AZ, you're reserving capacity within that zone whether you use it or not. If your infrastructure needs capacity standing by and ready, then this is the best way to make sure your resources will be there. For example, say your application goes from 10 instances to 1,000 in an unexpected spike. The sudden demand can be tough to fulfill without reserved capacity. It's important to note that "reserved" does not mean "guaranteed." With a reservation, AWS puts you first in line.

Region

With a Regional scope, the RI discount applies in any Availability Zone within its region. That being said, when you don't specify an AZ, you also don't reserve capacity. So that flexibility comes with a slightly higher risk. It's still a very low chance that you won't get the capacity you need, but you'll no longer be first in line. If you're purchasing RIs for vital systems, then it might be worth it to get the reserved capacity at the AZ level.



As of May 2019 . (Source: AWS)

Capacity reservations

Capacity Reservations give you the flexibility of a Regional RI with the surety of a Zonal RI. When you use Capacity Reservations, you pay the On-Demand rate to put a hold on instances within a specific AZ, but without actually spinning them up. Once you do spin up an instance, you stop paying for the Reservation and start paying for the instance. Say you purchase a m5.large Linux Capacity Reservation at $0.096/hr and keep it active for five hours, but run an m5.large Linux instance for the second and third hours. Your charge will be $0.48 (5 x $0.096) for three Reservation hours and two instance hours. Fortunately, RIs can be applied to Capacity Reservations like they can instances. If you turn on a Capacity Reservation that fits the instance attributes of a Regional RI in one of its AZs, then your RI will apply and you won't get charged the On-Demand rate. This is handy if you want to reserve capacity some of the time, but don't want to commit to the full term or specific AZ of a Zonal RI.

Zonal RIs can't be applied to Capacity Reservations, since they already reserve capacity.

What about Classic network?

If you worked with AWS before 2014, you might remember the Classic network. If you don't know what that is, it's because AWS switched over to the Virtual Public Cloud (VPC) network in December of 2013. Some older accounts can launch EC2-Classic instances, but any account created after December 4, 2013 is VPC only. If you use EC2-Classic, don't worry: RIs apply the same way to both networks.

How Reserved Instances are applied

An RI discount can be applied to an instance that matches the RI's attributes. The RI can be used for multiple instances, but only one at a time. The important thing to remember is that you're not purchasing a reservation for a specific instance ID, but a billing discount that can be applied to instances that fit the right attributes.

RI application in action:

You've purchased an m5.xlarge Amazon Linux in Availability Zone us-east-1b. Now what? If you spin up an m5.xlarge instance in us-east-1b, then the RI rate will apply to that instance. If you spin up a second m5.xlarge at the same time, it can't use the single RI you've purchased because it's already in use. So the new instance is billed at the On-Demand rate. You'd either need to purchase a second RI for the new instance or turn off the first instance so the newly-freed RI will switch over.

In that same example, if you spin up a t3.xlarge, then it will be billed as On-Demand since the instance type doesn't match, even if the RI isn't currently being used. Basically, an RI rate can only be used for instances that fit the same attributes and only applies to one resource at a time.

Using RIs with consolidated billing

RIs automatically transfer between linked accounts in a consolidated billing structure, but how it's applied depends on the account that bought the RI. The purchasing account always gets preference, but if it's not running any qualifying instances, the RI can be used by other linked accounts. If the reservations were purchased at the master payer level, then they're spread out among the linked accounts on an as-needed basis.

As a note, the zonal capacity reservation doesn't go along with the RI when inherited. That will always stay with the account where it was purchased.

Standard vs. convertible RIs

When you purchase a Reserved Instance, you can choose between a Standard or Convertible offering class. Convertible RIs are a middle ground between Standard RIs and On-Demand prices that trade some savings for additional flexibility. For example, a US West (Oregon) m5.large Standard One-Year RI paid All Upfront gives you 40% savings, while a Convertible RI with the same attributes is only 31% savings. Like the name suggest, a Convertible RI can be exchanged (or converted) into a different Convertible RI of equal or higher value with entirely new attributes. (See Part 3 for more info.)

The two RI types are applied the same way, but there are a few key differences:

Trait	Standard	Convertible
Terms (avg. savings)	1yr (40%), 3yr (60%)	1yr (31%), 3yr (54%)
Change AZ, instance size (Linux only), scope & networking type	Yes	Yes
Change instance family, OS, tenancy, & payment option	No	Yes
Benefit from Price Reductions	No	Yes
Sellable on the RI Marketplace	Yes	Not yet

At first glance, you might be tempted to go with Convertible RIs just to be on the safe side for the flexibility. But as you can see, Standard RIs provide much more savings and can be sold on the RI Marketplace.

In the end, the right kind of RIs will depend on your company and how you'll use the RIs.

Reserved Instance pricing and breaking even

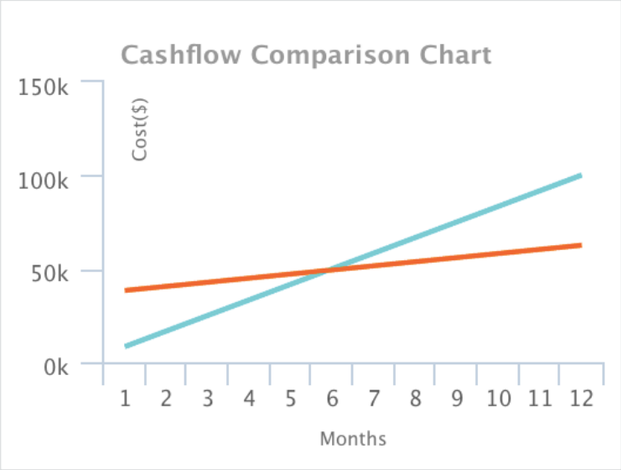
On-Demand instances charge you per-second according to your usage (for a minimum of 60 seconds). If you're not using the instance, then you're not charged. It's as simple as that. RIs work a little differently. With an RI, you're buying a chunk of discounted use (broken up by seconds) that spans the duration of the reservation, whether you use them or not.

When it comes to paying for that reservation, you have three options:

All Upfront	Pay for the entire reservation in one payment. It's a lot of upfront cash, but offers the highest savings rate.
Partial Upfront	Pay for part of the usage time upfront, then pay the remainder in monthly payments. The discount is closer to All Upfront, but not quite as good, making it a solid middle ground.
No Upfront	Pay for the reserved time in monthly installments spread out across the entire duration. This payment option has the lowest savings rate and requires a successful billing history.

To understand these options, it helps to understand exactly what you're purchasing. For AWS, a year is defined as 31,536,000 seconds (365 days). Three years is defined as 94,608,000 seconds (1095 days). The more of those seconds you pay for upfront, the higher the savings rate AWS gives you.

No matter which option you choose, you need to get enough use out of any RI to break even and then generate savings. We define the break-even point as the point at which you've used the reservation for enough hours to make up for the cost of the reservation by accumulating savings over On-Demand. Everything beyond that point is savings gravy. The break even point will vary depending on the type of RI you purchase. Three-year standard terms paid All Upfront will give you more savings and a lower break-even point, but requires more initial investment.



As an illustration, say you're using an m5.xlarge in the US-West (Oregon) region. On-Demand for this instance runs around $0.19 an hour. A Standard One-Year Term with Partial Upfront payment will cost $512 and $42.34/mo for a total of $1,016. That's an effective hourly rate of about $0.12 for 8,760 hours, which is a 39% discount. Running instances that size for 5,192 hours with On-Demand pricing will incur the same expense. So any use beyond 5,192 hours is pure savings. As a contrast, a Standard Three-Year Term paid All Upfront costs $1,937 for an effective hourly rate of $.07 per hour for 26,280 hours and 62% savings. The break even point? About 10,088 hours.

As you can see, RI planning can get very complicated, very quickly. A good RI planning tool (like we have in Apptio Cloudability) can instantly show you where the break-even point will be and analyze your past use to figure out whether the investment in an RI would be worthwhile.

Part 2:

RI Planning & Purchasing

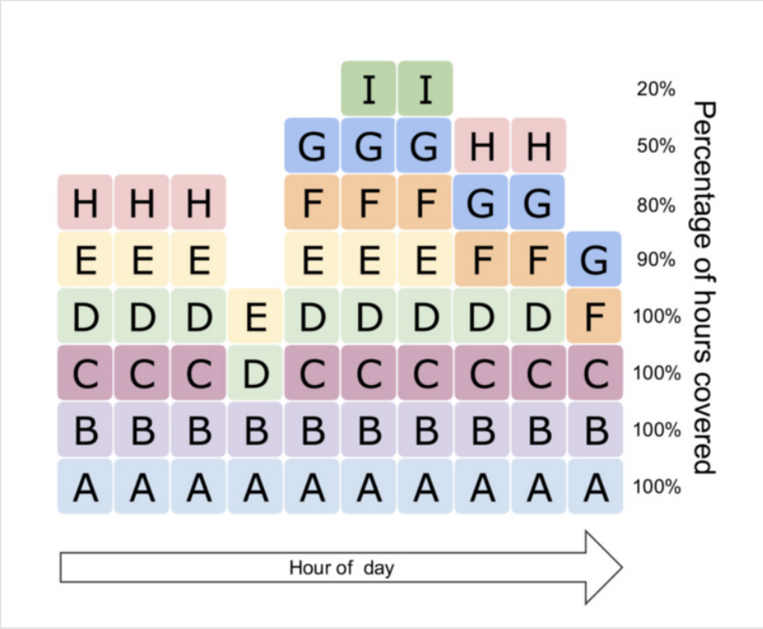
Finding your RI waterline

A common mistake during RI planning is to only look at the isolated utilization rate of instances. On the surface, it seems like a good idea. After all, if you only use an instance for eight hours (33%) of a day, then it doesn't make sense to pay for an RI with a 60% break-even point, right? Well, not necessarily. Remember that RIs apply to any instance that fits its attributes, even if it's not part of the same project or application. At the same time, remember that RIs cannot be applied to multiple instances at the same time. So rather than look at the simple utilization rate, you should look at how your use is spread out over the day.

In this, an RI could only apply to Instance A while leaving Instance B and C at On-Demand pricing. Since none of the instances are run long enough to hit the break-even point, On-Demand is the more affordable option.

But this example is different. In this one, each instance is still running for only eight hours every day, but never at the same time. That means a single RI could apply to all three instances, making the RI worth the cost.

To help figure this out, we recommend the waterline RI planning model. In this model, the use of instances that could fall under the same RI are all grouped together, then plotted against their hourly use. The result looks something like this:



In this graphic, each letter represents one of eight different instances of the same type. For the purposes of this example, let's assume this same ten-hour pattern is repeated for a whole year. At a glance, this charting method shows you that there are always four instances running, with five running 90% of the time and six running 80% of the time. That means:

- 4 RIs would have 100% utilization
- 5 RIs would have 90% utilization
- 6 RIs would have 80% utilization

The trick here is to select a waterline for your organization, or a savings level for your RI purchases. This can vary depending on many factors, including how many of the RIs you're planning to purchase All Upfront.

If you selected an 80% waterline, then charting your use like this would instantly show you that you need to purchase six RIs to hit your savings goals. As a side note, this example shows the weakness of looking at an individual utilization rate. Only four instances in this graphic are used 80% of the time (A-D), but only buying four RIs would miss out on two RIs worth of savings.

It might not seem like that much, but look at it this way: buying six RIs instead of four increases your RI utilization rate by 50%. If you're currently saving $600,000 a year by using RIs, then utilizing those extra RIs will increase your savings to $900,000.

With many organization running hundreds, if not thousands, of instances at a time, it's essential to have an RI Planner (like Apptio Cloudability's) that can be adjusted to give recommendations based on your savings waterline.

A few more planning tips

Use three-year RIs for maximum savings

Three years is a big commitment, so it's not surprising that many people shy away from purchasing three-year RIs. But three-year RIs offer substantially bigger savings with an earlier break even point, usually only slightly longer than one year. That gives them, by far, the biggest savings potential for how your use is spread out over the day.

Term	Approx. average discounts (No Upfront, Partial Upfront, All Upfront)
1 yr Standard	37%, 40%, 41%
1 yr Convertible	27%, 31%, 32%
3 yr Standard	57%, 60%, 62%
3 yr Convertible	50%, 54%, 55%

RI Term has the biggest single-factor impact on your savings.

Also, remember your RI flexibility options. You'll always get the most savings with a Standard three-year RI (62%), but a Convertible three-year RI (55%) is still better than a Standard one-year RI (41%). If you feel the need to hedge your bet, then the Convertible RI will give you more options later if you need to change.

Figure out how much to pay upfront

If you look at the above chart, you'll notice that the difference between No Upfront and All Upfront is about 5%. The impact of that 5% on your finances is going to depend on several different factors, including which term you plan to use and where you place your waterline.

Payment Option	Pros	Cons
No Upfront	No initial investment Lower outlay often means easier & faster approval	Higher payments Monthly obligation Lowest savings
Partial Upfront	Lower initial investment 3-4% more savings Possibly easier approval	Some initial investment Monthly obligation Possibly complex approval
All Upfront	No monthly costs Highest savings level Lowest break-even point	High initial investment Possibly complex approval due to large lump sum payment

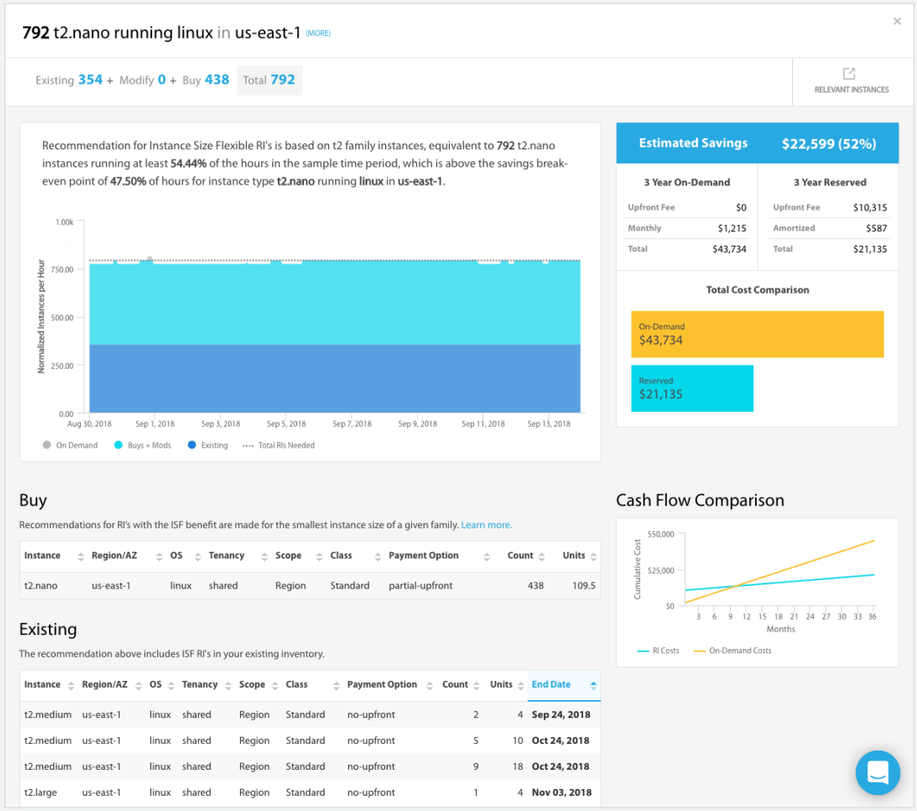
In the end, it really comes down to your company's financial principles and operating capital. Balance the pros and cons with your capital flow to find the best option.

Your first RI purchase

For your first RI purchase, your goal should be to make the biggest dent in your On-Demand spending with the minimal amount of risk. A good way to do this is to set a higher waterline, then focus on high-use instances that have the least chance of being turned off. Apptio Cloudability often refers to this as picking the low-hanging fruit.

There's a temptation to overbuy and make as big of a splash as possible, especially if you're trying to prove the savings potential of RIs to the rest of the company. But in the end, it's much better to make small, iterative purchases. Buying too many RIs now has the potential to lock you into the wrong instances. Not to mention that fact that more complicated and more expensive buys will often have more complicated approval processes. You can always purchase more RIs later as you become more comfortable with them and have a longer track record for your cloud usage.

The right cloud cost management tool will be essential at this phase. Not only are you moving into a new technological arena, but it's common to be under pressure to justify your actions and prove the expected ROI. A good tool, like Apptio Cloudability, will give you the data you need to have confidence in your decisions and to make your case when getting approval.



A good tool can give you wide-reaching recommendations that include both the break-even point and projected savings.

Part 3:

Modifying RIs

Modifying Standard Reserved Instances

As your infrastructure changes and grows, you might need to change your RI portfolio up a bit. While the core of a Standard RI (the instance family, tenancy, OS and payment option) can't change, there are a few which can, namely the AZ, scope, instance size and network type. Modifying an RI is free and you can do it as many times as you like. (NOTE: You can't change or cancel a pending modification request after you submit it.)

Modifying AZs or Region Scope

If you've selected a specific AZ within a region, then you can modify the AZ, such as moving it from US-West-2a to US-West-2b. When you modify the AZ, the zonal capacity reservation goes with it. As a note, you can't modify the RI to move between different regions. If you bought it in US-West-2, then it has to stay there. Modifying the AZ is a handy tool to keep your infrastructure together. If new essential projects that require reserved capacity are all being built in EU-West-1b, then you might want to shift your RIs (and workloads) for existing essential products from EU-West-1a so they can share RIs.

In addition to modifying the AZ, you can also modify the scope of the RI between Region and AZ. This is handy in situations where you no longer need reserved capacity and want to free up the RIs for use in multiple AZs. And remember, if you still need that capacity, you can always purchase a Capacity Reservation. All in all, the ability to modify the AZ and scope makes it less risky to choose a specific AZ and reserve capacity. A tool with the right Dashboards and Views can be incredibly handy here for giving you the visibility you need to keep on top of your RI distribution.

Modifying size within an instance family

AWS offers its users a variety of instances to choose from, each specialized for different compute, memory, and storage roles. Instances are grouped into families and versions according to each role, then differentiated into individual types according to the size of the instance. As a note, you cannot modify standard RIs between versions because they have different hardware. So an m4 RI can't be modified into an m5 RI.

EC2 instance families

General Purpose	Compute Optimized	Memory Optimized	Accelerated Computing	Storage Optimized
A1	C5	R5	P3	I3
T3	C5n	R5a	P2	I3en
T3a	C4	R4	G3	D2
T2		X1e	F1	H1
M5		X1		
M5a		High Memory		
M4		z1d		

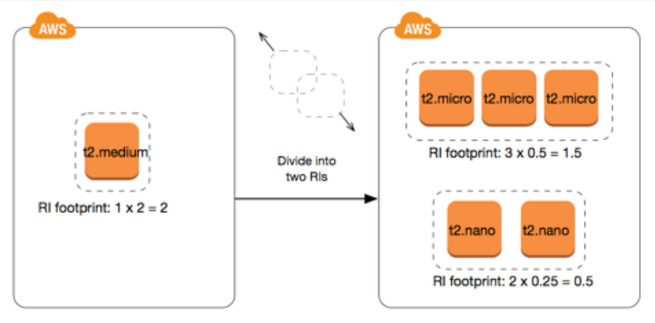
Any reservation running on a Linux OS can be modified to a different size within the same instance family. Making those changes comes down to ensuring that when you make a change, your overall instance size footprint remains the same. Your instance size footprint is calculated by combining the normalization factors of all your RIs being modified. The larger the instance size, the higher the normalization factor. The smaller the instance, the lower the number. By adding these normalization factors together you can calculate your instance size footprint.

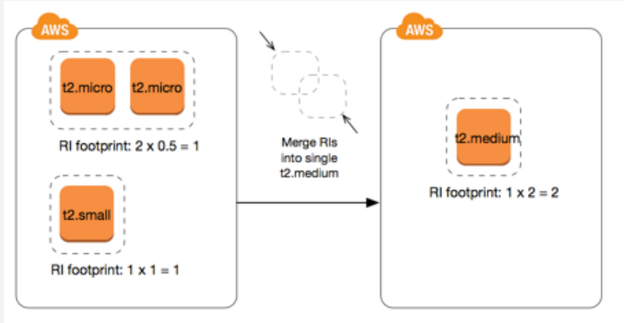
Normalization factor table example

Size	Micro	Small	Medium	Large	xlarge	2xlarge	4xlarge	8xlarge
Units	0.5	1	2	4	8	16	32	64

Example:

To calculate the instance size footprint of two m5.large instances (normalization factor of 4) and one m5.2xlarge instance (normalization factor of 8), you would add 4 + 4 + 8 to get a size footprint of 16. You can modify those three reservations into any number of differently-sized instances within the M5 family, so long as their total instance size footprint remains equal to 16.





(Source: AWS)

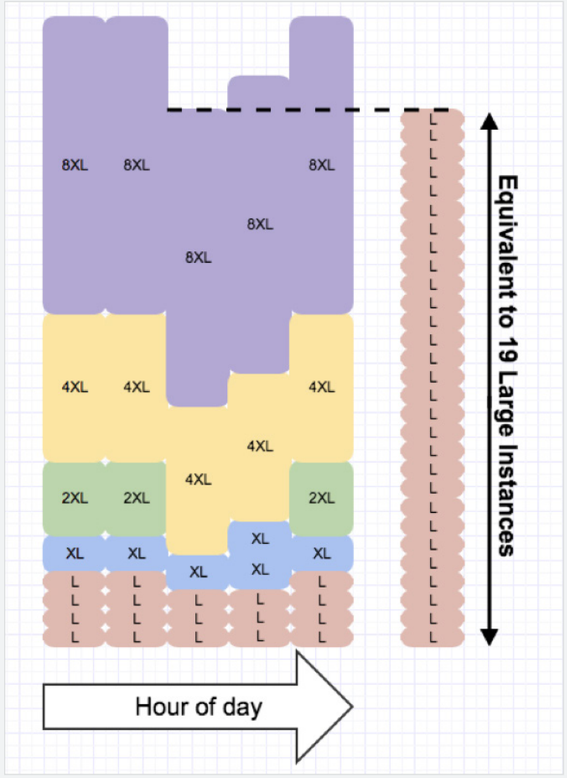
Reservations are priced proportionally to each other, so as long as your instance size footprint remains the same, RI modifications won't impact your bill. It's important to remember that you can only modify the size of reservations that are running on Linux and only within the same instance family.

There are a few reservation types that may not be resized because they are the only available size in a family:

- cc2.8xlarge
- cr1.8xlarge
- hs1.8xlarge
- t1.micro

Instance Size Flexibility (ISF)

If you have Regional Linux RIs with Default tenancy, then you don't have to worry about modifying your instance size. With ISF, your RIs will automatically apply to all sizes of an instance family within the region, even across multiple consolidated accounts. ISF uses the same normalization factor to figure out your usage footprint, then applies RIs accordingly.



Even though five different sizes are used, the nineteen large RIs will apply to everything below the dotted line.

That being said, there are a few things to keep in mind about ISF. ISF is only available with Amazon Linux, not other forms of Linux. If you select an AZ to reserve capacity, then ISF won't apply. Flexibility must be within the same family, so m5 RIs won't apply to c4 or m4 instances.

Modifying between Classic and VPC

You can modify any reservation running on a Linux OS instance between EC2-Classic and EC2-VPC. As we mentioned before, this is only an option if your account was created before December 4, 2013. Anything after that will be created in VPC, and all of the modern EC2 classes are only available in VPC. If you have RIs in the Classic network, then you can modify them to the VPC network for free.

The Reserved Instance Marketplace

If you have Standard RIs that aren't being used and that can't be made more effective through modification, you can recoup some — though not all — of the cost by selling them in the Amazon EC2 Reserved Instance Marketplace. There's no guarantee that your reservations will be bought if you put them up for sale, but if you have a significant number of reservations that won't save you any money no matter what, then trying to sell them might be your most cost-effective option. At the time of writing, only Standard RIs can be sold on the RI Marketplace.

Exchanging Convertible RIs

Since their introduction in 2016, Convertible RIs have become extremely popular. And with good reason. Convertible RIs can be exchanged, merged and split to fit your changing infrastructure. While you do save less compared to Standard RIs, the additional flexibility of Convertible RIs can be more than worth it.

Basic rules for exchanging

There are a few core rules that limit how your RI can be converted:

- Convertible RIs can only be exchanged for other Convertible RIs
- All Upfronts and Partial Upfronts can be exchanged with each other, but they cannot be exchanged for No Upfronts.
- No Upfronts can be exchanged for Partial Upfronts or All Upfronts.
- No Upfronts can be exchanged for other No Upfronts, but only if the new hourly price is the same or higher.
- If you exchange multiple RIs with different expiration dates, then the one farthest in the future will be used for the new RI's expiration date.
- RIs can only be exchanged for RIs with the same term (one-year or three-year).

True-up costs

Convertible RIs can only be exchanged for RIs of equal or greater list value. The list value is computed by multiplying the hourly price by the remaining hours, then combining it with the upfront price. If the list value of the new RI is the same, then you don't have to pay anything. If the list value is more, then you have to pay a true-up cost, defined by AWS as "a prorated upfront cost of the difference between the Convertible Reserved Instances that you had and the Convertible Reserved Instances that you receive from the exchange." If you're exchanging multiple RIs, then all of the values are combined to create the list value, and that's used in calculating the exchange. Only whole RIs can be bought, so if the value comes up with a partial RI, then the exchange will be rounded up and you'll pay a true-up cost. As a note, you can never exchange Convertible RIs for cheaper ones and get the difference back. If the total value of the new RI is less than the original RI, then AWS automatically gives you enough of the new ones to make sure the value is the same or higher than the original.

Example:

You have an RI with a list price of $55 that you want to exchange for a new instance type that has a list price of $20. This would give you 2.75 RIs ($55/$20 = 2.75), so the exchange would be for 3 new RIs. You would then pay a $5 true up cost.

Merging Convertible RIs

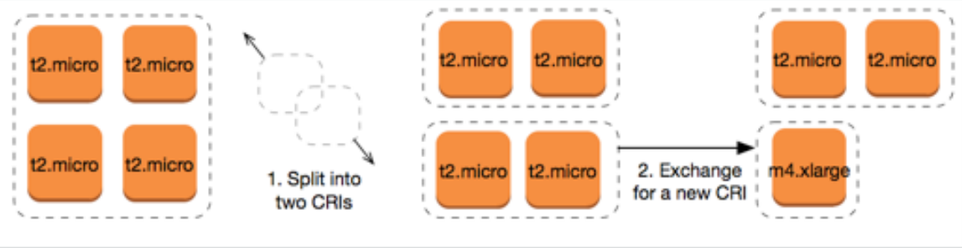
In addition to exchanging individual RIs, you can also exchange multiple Convertible RIs and merge them into new Convertible RIs. The process works very much that same as other exchanges in that you can only merge the RIs into new RIs of equal or greater value.

The part where it gets a little tricky is when you merge one-year and three-year RIs. When you merge RIs with different term lengths, then the new RI will have a term equal to the longest of the two terms (so a one-year term and a three-year term will yield a three-year term). The new expiration date will still be the highest of the two original RIs — even if that date was on the one-year RI.

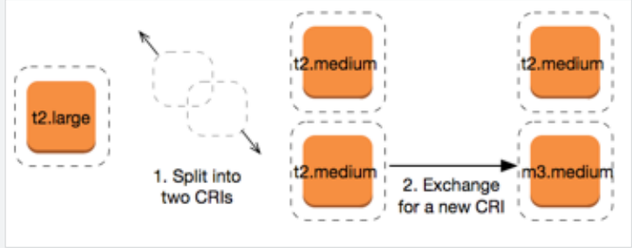
So if you're merging a one-year RI that expires in eight months with a three-year RI that expires in six months, then the new RI will be a three-year RI that expires in eight months. This is especially important to remember since the new RI's value will be based on it having a three-year term, which can have an effect on your true-up costs.

Splitting Convertible RIs

By splitting Convertible RIs, you can keep an RI with the current attributes at a lower level while exchanging the unused RI portion for a new one. Doing this is actually a two-step process. First, you have to modify the existing RI to split it into smaller reservations. Then one or more of those pieces is exchanged to form a new RI.



Splitting a four-instance t2.micro RI into a two-instance t2.micro RI and one m4.xlarge RI. (Source: AWS)



A t2 large RI, with a normalization factor of four, splits into two t2.medium RIs, each with a factor of two.Then one t2.medium is exchanged for an m3.medium. (Source: AWS)

The process is similar if you have a single-instance RI. In this case, the splitting uses the same instance size footprint rules you use when modifying a Standard RI. Once split, you can exchange one of the pieces for a whole new RI.

RI flexibility means less risk and more savings

At first glance, it's easy to think that RIs lock you into a cloud configuration, a prospect that would make anyone a little gun-shy. Fortunately, RIs are still pretty flexible. The ability to modify Standard RIs and the exchangeability of Convertible RIs substantially lower the risk of purchasing RIs because you always have the option of adjusting them later on as your needs change. In turn, that means you're free to purchase more RIs and save more on your cloud.

Part 4:

Reserved Instance Portfolio Management

Continuous cloud cost management

Your RI portfolio is a powerful tool for managing your cloud cost. So use it, and not just once. Your cloud cost should be continuously managed to help you get the most from your cloud, and managing your RI portfolio is a big part of how you do that.

Monthly RI purchasing

If your AWS needs remained exactly the same for an entire year, then you could cover everything you need with a single RI purchase and just sit back to enjoy the savings. But it's never that simple — and you don't want it to be. Changing infrastructures mean that your company is evolving, innovating, and figuring out how to do more with the cloud.

Your RI purchasing schedule should be designed to adapt to change without getting in the way, which is why we recommend a monthly RI purchasing schedule. By making monthly RI purchases, you'll have enough data from infrastructure changes to make meaningful RI decisions, something that can be harder if your purchases are too frequent or infrequent.

Buy RIs in a cross-section

It can be tempting to sort monthly RI purchasing into individual groups or projects and tackle them one at a time, but this approach defeats the purpose of monthly purchases. Look at it this way: If you had twelve teams, and you bought RIs for each team every month, then it would be a full year before the first team got more RIs. And who knows how many instances were being billed at On-Demand rates during that time?

Whenever possible, your monthly RI purchases should take a cross-section approach. See what's happened with each part of your infrastructure every month, then buy a selection of RIs that slices across your whole company.

Lifecycle management

Getting the most from your RIs takes more than just smart purchasing. Your RI portfolio needs continuous management to make sure you're getting the most use out of the RIs you already have. If your RIs aren't being used, then you need to be able to take action.

There are two good metrics for monitoring RIs: **your current RI coverage** and **your current RI waste**. By modifying current RIs and purchasing new ones, you can get your coverage high and your waste low. You can monitor these values in a cloud cost management tool like Apptio Cloudability.

Monitoring and increasing reservation coverage

You can calculate your reservation coverage by comparing your total EC2 usage hours with your total hours covered by a reservation. In Apptio Cloudability, this value is computed and graphed for you. Cloud environments need to have a certain degree of elasticity, so many companies strive for an RI coverage rate of 80-90%.

There are several ways to raise your RI coverage rate:

- Purchase new RIs
- Modify existing RIs
- Change infrastructure to match existing RIs

Since it's free to modify RIs, it's usually the easiest and fastest action to take first. If you have a cloud cost management tool like Apptio Cloudability, you should pull up the RI Planner, then implement the recommended modifications to fix underutilized RIs or recommended RI purchases.

Monthly RI purchases and modifications help to build a culture of cloud cost management within your company. As your RI strategy matures, it will become easier and easier to increase your RI Coverage Rate and get more from your cloud spend.

Monitoring and minimizing RI waste

RI waste is a fairly straightforward concept: if you have RIs that aren't being used, then they're being wasted. Figuring this out on your own can be a time-consuming task that involves complicated spreadsheets and error-prone manual processes.

A good cloud cost management tool will show you when you have waste. You'll know you have a good tool because it will not only show you when RIs are underutilized, it will also tell you how much potential savings you're losing and rank them accordingly. That way you'll be able to see exactly which RIs are costing you the most — and how you can get the most bang for your buck by fixing the problem. With Apptio Cloudability, this functionality is built into our Reserved Instance Portfolio feature.

What's next?

Nothing can save you money on your AWS bill like Reserved Instances. Whether you're already spending millions on RIs or just getting set up to make your first purchase, these RI basics and strategies will help you get the most from them.

Using these strategies and the Apptio Cloudability platform, our customers routinely save at least 30% on their cloud spend. Interestingly enough, most of them end up investing that money back into their company through more developers, increased cloud resources or other investments. In effect, using RIs and Apptio Cloudability helps them dramatically increase their budgets without actually getting any more investment.

Try to keep this in mind while getting buy-in for your RI strategies. If someone pushes back, ask them what they would do with another third of their budget. Because that's what you'll unlock with your RI strategies and by building a culture of cloud cost optimization.

We're not going to lie — it takes a bit of work to get solid RI system in place. But once you do, the rewards are worth it.

AWS Savings Plans

In November of 2019, AWS released Savings Plans, a new way for customers to save on their cloud spend by committing to a level of spending over an extended period.

Savings Plans are available in two different flavors:

- EC2 Savings Plans cover a single family of EC2 compute instance usage (e.g., m5) in any single region regardless of size or operating system. Pricing for EC2 Savings Plans maps to pricing for Standard Reserved Instances, meaning they offer the most savings.
- Compute Savings Plans cover (and can float across) all families of EC2 compute and Fargate in all regions. Pricing for Compute Savings Plans maps to pricing for Convertible Reserved Instances, which means they result in slightly less savings than EC2 Savings Plans, but offer much more flexibility.

To learn more about Savings Plans and strategies to take advantage of them, check out our **Emerge articles** and **Apptio resources**.

About Apptio Cloudability

Apptio Cloudability helps IT, Finance and Business teams manage the variable spend model of cloud with a FinOps platform that uses data science, machine learning and automation. With over $9 billion in cloud spend under management, we enable customers to create financial accountability and lower the unit economics of cloud.

Get the resources you need at **cloudability.com/resources**

About FinOps

FinOps is a combination of best practices, culture and systems that enable distributed IT, Finance and Business teams to tune cloud deployments for speed, cost or quality. The FinOps journey consists of three iterative phases — Inform, Optimize, Operate.

Learn about FinOps by reading **FinOps: A New Approach to Cloud Financial Management**

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