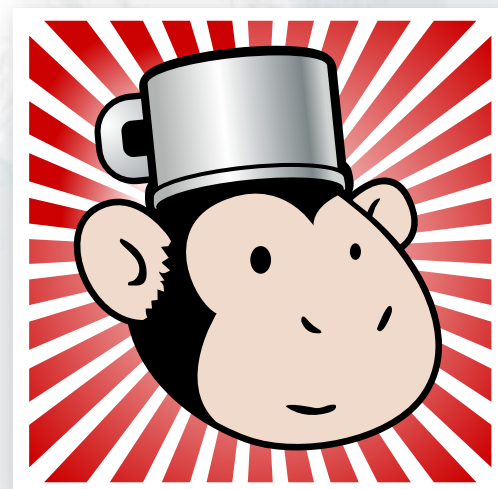


BoxGrinder

Bob McWhirter
JBoss Fellow



BoxGrinder

Bob McWhirter
JBoss Fellow

Who is Bob?

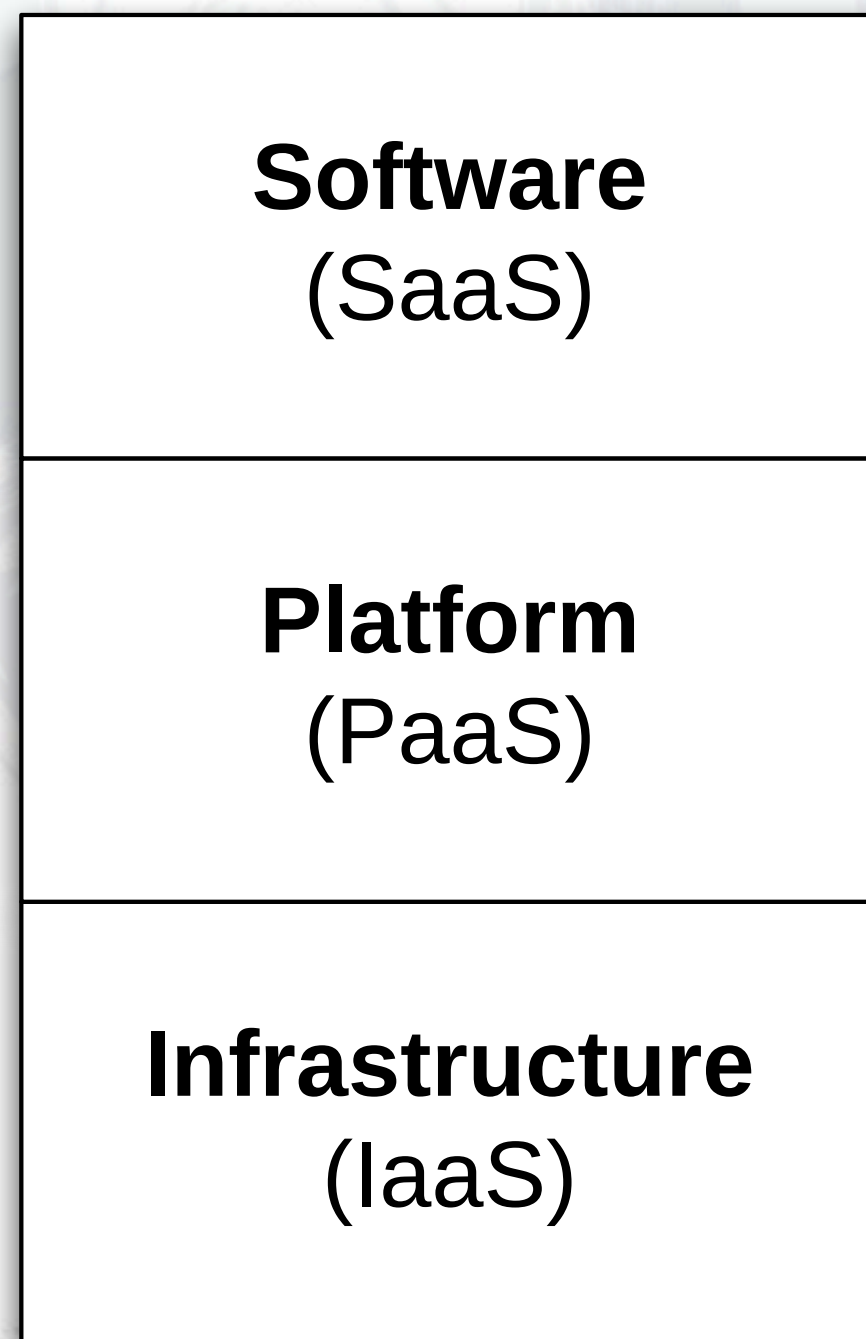
- JBoss Fellow
- Chief Architect of Middleware Cloud Computing
- Founder of...
 - The Codehaus
 - Drools
 - TorqueBox

Who is Marek?

- Marek Goldmann
- Polish!
- Electronic musician
- The guy who *actually* does all the work

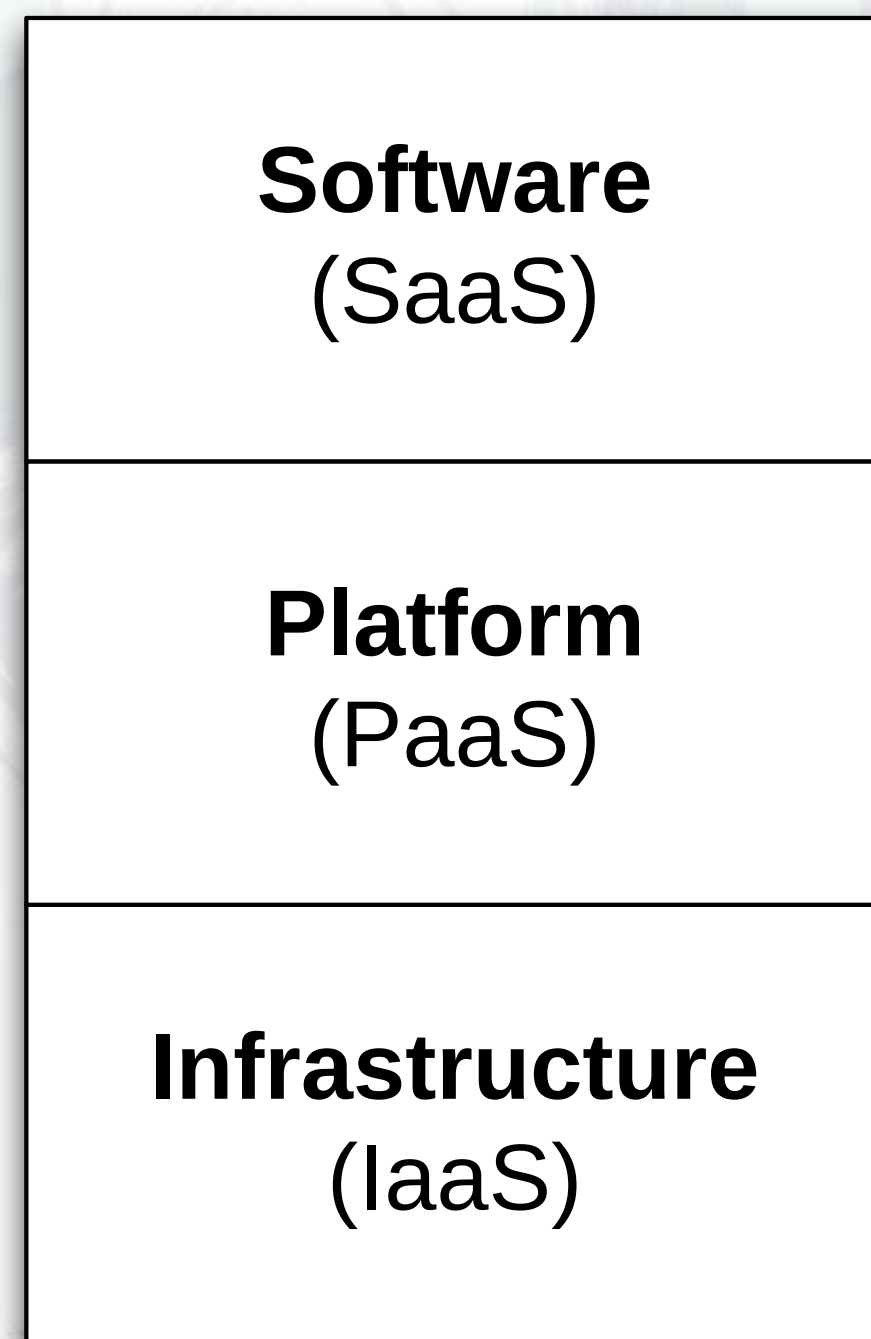


Background



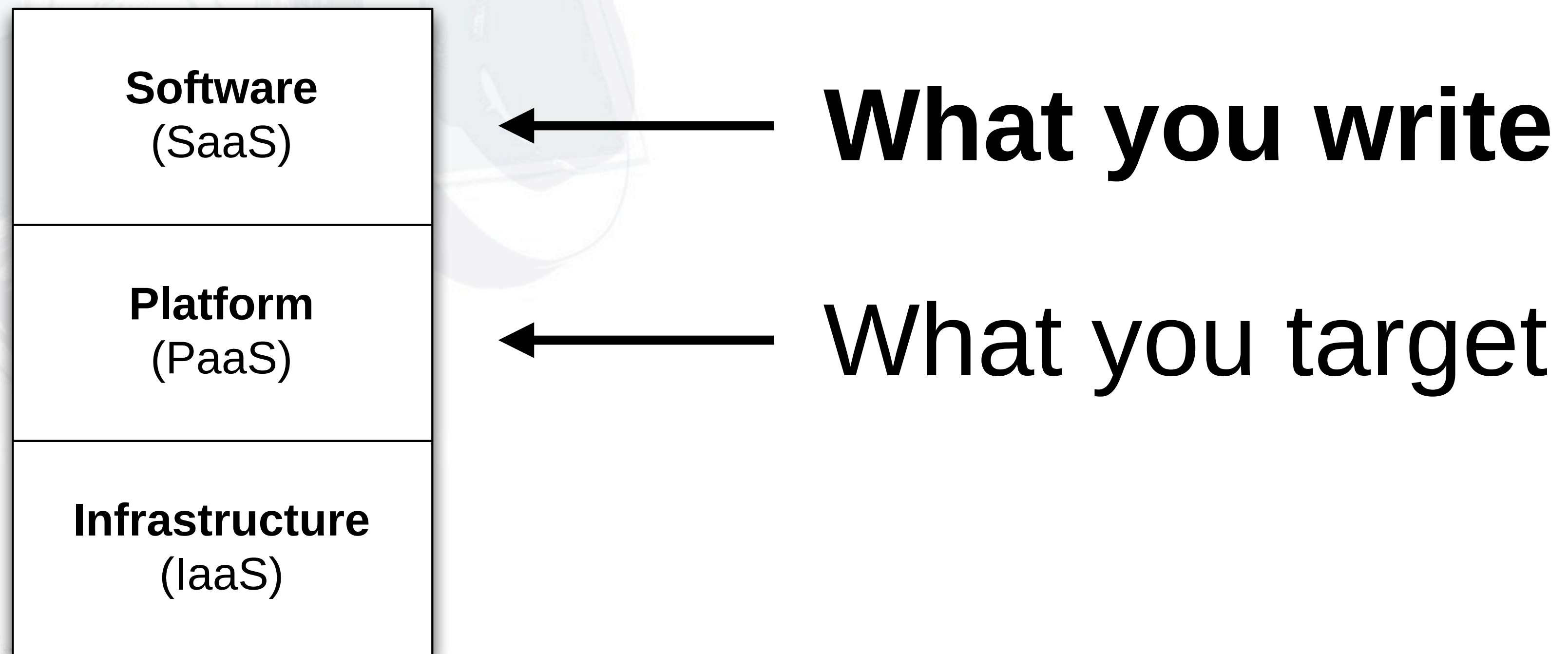
Simplified
“cloud” stack

Background

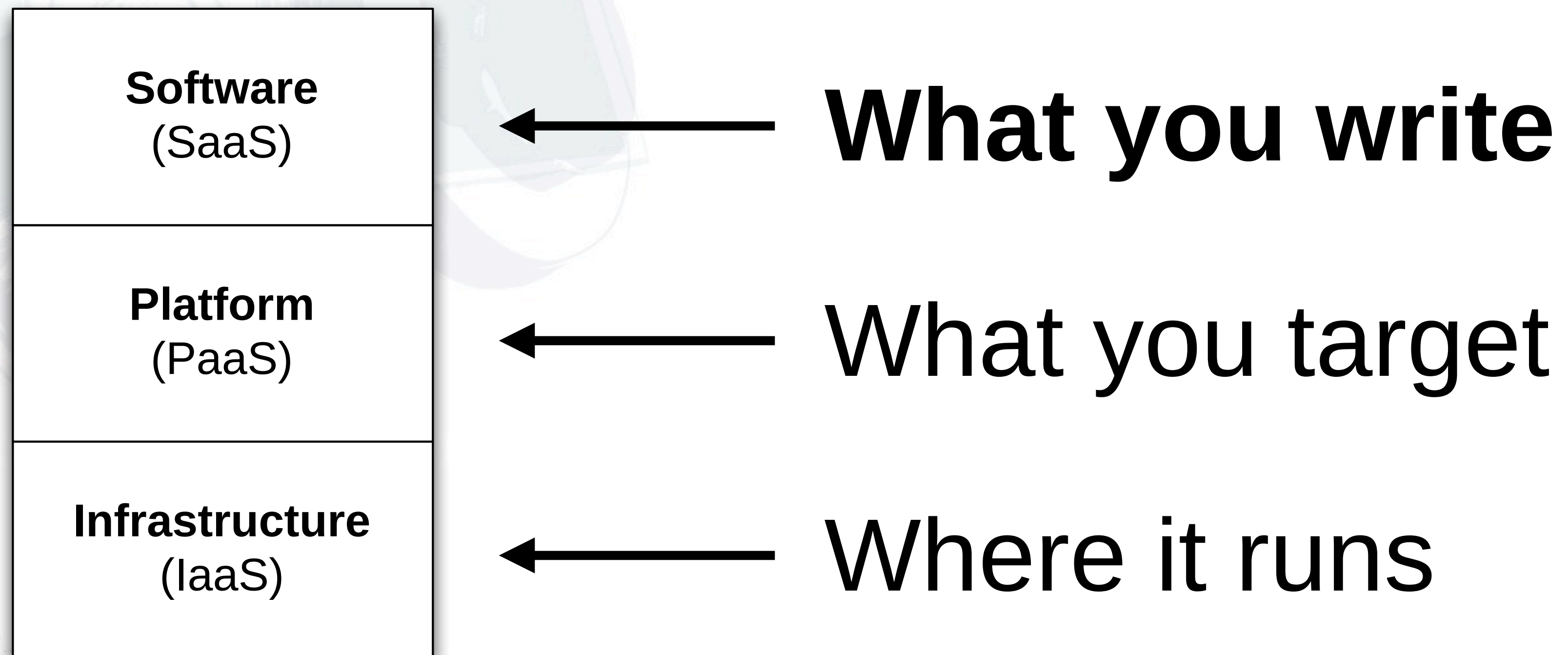


← **What you write**

Background



Background



Background

Software
(SaaS)



What you write

Platform
(PaaS)




What you target

You don't want to care

Infrastructure
(IaaS)



Where it runs



BoxGrinder helps turn
bare **hardware** into a
useful substrate.

(or “platform”)



BoxGrinder doesn't
care what you consider
to be a *platform*



Virtual Machines

“appliances”



But first...

There's at least **two different ideological camps** with opinions on creating virtual machines...

Bake v. Fry

Bake: Produce a complete virtual machine offline, before first use.

Fry: Produce a complete virtual machine by booting a basic VM and then applying configuration.

Bake

Quicker launch
Requires more storage
Not up-to-date

Fry

Longer launch
Less storage
More up-to-date

Storage

Bake

Base Appliance

Web Appliance

Messaging Appliance

Transactions Appliance

Fry

Base Appliance

Web config

Messaging config

Transactions config



Bake!

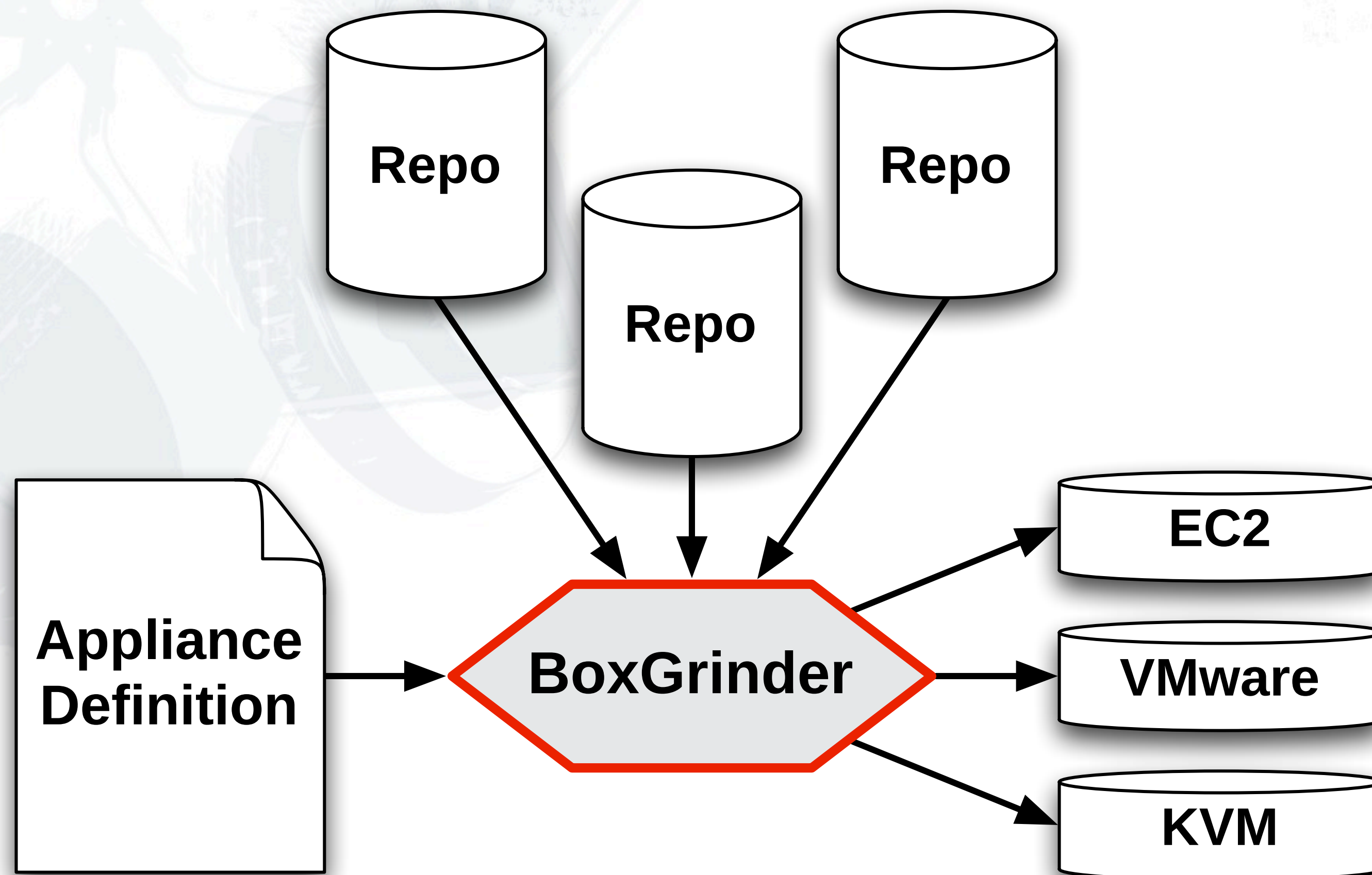
We think **baking** is The Right Way,
especially for developers simply
looking for reliable platforms.

Bake & Fry

Baking out an appliances **does not prohibit** using existing update mechanisms. It just provides a **starting point**.

Grind

BoxGrinder grinds out fully-configured and usable virtual machines for a variety of IaaS fabrics.



Appliance Definition

- YAML – not XML
- Allow mix-ins/composition
- Easily re-target different base OSes



Let's build a **JBossAS Appliance**

Quick Example

```
name: back-end
version: 1
release: 1
summary: back-end appliance with JBoss AS 6
hardware:
  memory: 512
  partitions:
    "/":
      size: 2
appliances:
  - cirras
packages:
  includes:
    - jboss-as6
    - jboss-as6-cloud-profiles
    - java-1.6.0-openjdk
```


Prolog

```
name: back-end
version: 1
release: 1
summary: back-end appliance with JBoss AS 6
hardware:
  memory: 512
  partitions:
    "/":
      size: 2
appliances:
  - cirras
packages:
  includes:
    - jboss-as6
    - jboss-as6-cloud-profiles
    - java-1.6.0-openjdk
```


Prolog

name: back-end

version: 1

release: 1

summary: back-end appliance with JBoss AS 6

Hardware

```
name: back-end
version: 1
release: 1
summary: back-end appliance with JBoss AS 6
```

```
hardware:
  memory: 512
  partitions:
    "/":
      size: 2
```

```
appliances:
```

- cirras

```
packages:
```

```
includes:
```

- jboss-as6
- jboss-as6-cloud-profiles
- java-1.6.0-openjdk

Hardware

hardware:

memory: 512 ***512MB***

partitions:

"/":

size: 2 ***2GB***

Appliance Mix-ins

```
name: back-end
version: 1
release: 1
summary: back-end appliance with JBoss AS 6
hardware:
  memory: 512
  partitions:
    "/":
      size: 2
```

```
appliances:
```

```
- cirras
```

```
packages:
```

```
includes:
```

- jboss-as6
- jboss-as6-cloud-profiles
- java-1.6.0-openjdk

Appliance Mix-ins

appliances:

- cirras **Mixing in `cirras.appl`**

Tangent: cirras.appl

```
name: cirras
summary: Appliance template for CirrAS appliances
os:
  name: fedora
  version: 11
hardware:
  memory: 256
  partitions:
    "/":
      size: 1
packages:
  includes:
    - bash
    - kernel
    - grub
    - e2fsprogs
    - passwd
    - policycoreutils
    - chkconfig
    ...
```


Tangent: cirras.appl

name: cirras

summary: Appliance template for CirrAS appliances

os:

name: fedora

version: 11

hardware:

memory: 256

partitions:

"/":

size: 1

packages:

includes:

- bash
- kernel
- grub
- e2fsprogs
- passwd
- policycoreutils
- chkconfig

...

Appliance Mix-ins

cirras.app1 mixed in

os:

name: fedora

version: 11

Appliance Mix-ins

cirras.app1 mixed in

repos:

- name: "cirras-#ARCH#"
baseurl: "http://repo.boxgrinder.org/cirras/p"
- name: "cirras-noarch"
baseurl: "http://repo.boxgrinder.org/cirras/p"

Appliance Mix-ins

back-end.app1

cirras.app1

overrides

hardware:
memory: 512
partitions:
"/":
size: 2

hardware:
memory: 256
partitions:
"/":
size: 1



Okay, let's get back to
back-end . appl . . .

Contents

```
name: back-end
version: 1
release: 1
summary: back-end appliance with JBoss AS 6
hardware:
  memory: 512
  partitions:
    "/":
      size: 2
appliances:
  - cirras
packages:
  includes:
    - jboss-as6
    - jboss-as6-cloud-profiles
    - java-1.6.0-openjdk
```


Contents

packages:

includes:

- jboss-as6
- jboss-as6-cloud-profiles
- java-1.6.0-openjdk

Contents

packages:

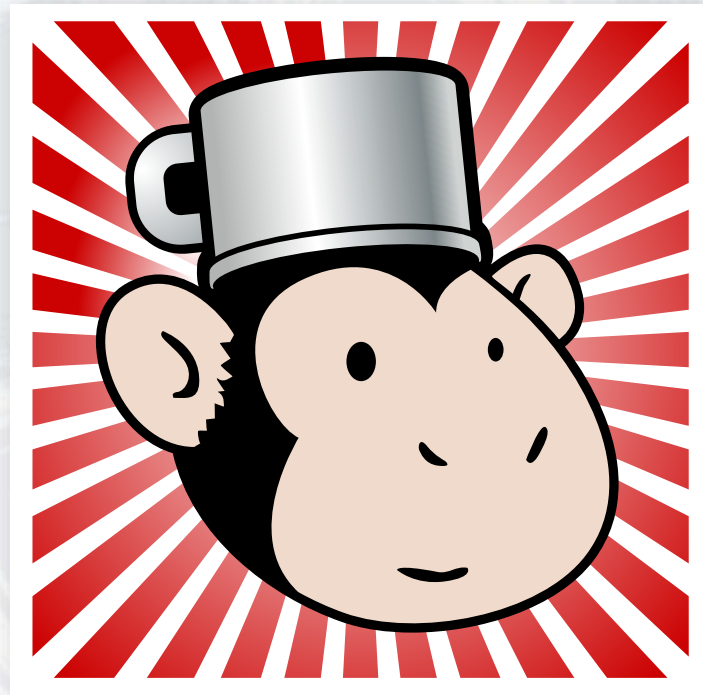
includes:

- jboss-as6
- jboss-as6-cloud-profiles
- java-1.6.0-openjdk

plus everything from
cirras.appl



Great, I have a **text file**, what
about a **virtual machine**?



BoxGrinder

Build

Meta Appliance

Start with our **meta-appliance** VM
(built with BoxGrinder)

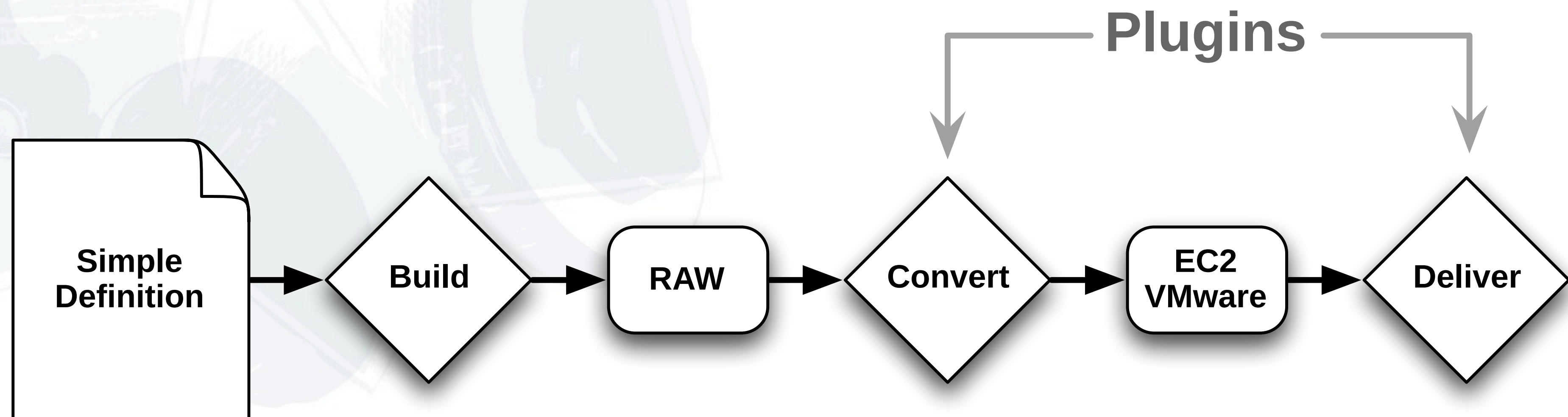
Ruby • RubyGems • Git
RPM dev tools • qemu • libguestfs

Simple installation

```
$ gem install boxgrinder-build
```

```
$ rpm -Uvh http://s3.amazonaws.com/ec2-downloads/ec2-ami-tools.noarch.rpm
```


Pipeline



Do it!

```
$ boxgrinder-build -V \
  ../cirras/appliances/back-end.appl
```

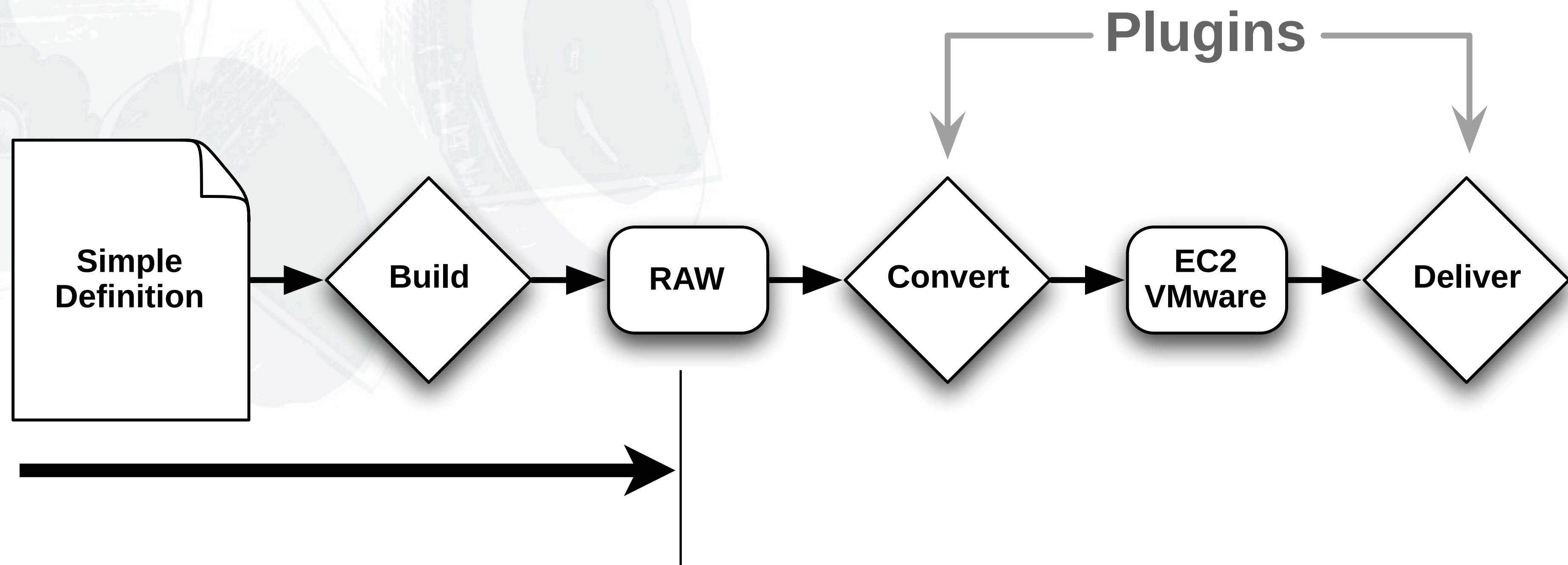
```
D, [2010-06-18T18:57:33.364113 #5110] DEBUG -- : Reading definition from '../cirras/appliances/back-end.appl' file...
D, [2010-06-18T18:57:33.365527 #5110] DEBUG -- : Reading definition from '../cirras/appliances/cirras.appl' file...
D, [2010-06-18T18:57:33.369167 #5110] DEBUG -- : Executing operating system plugin for fedora...
I, [2010-06-18T18:57:33.371979 #5110] INFO -- : Resolving packages added to back-end appliance definition file...
D, [2010-06-18T18:57:33.376092 #5110] DEBUG -- : Querying package database...
D, [2010-06-18T18:57:33.377037 #5110] DEBUG -- : Executing command: 'sudo repoquery --quiet --disablerepo=* --
enablerepo=boxgrinder_build-fedora-11-base,boxgrinder_build-fedora-11-updates,boxgrinder_build-cirras-
i386,boxgrinder_build-cirras-noarch -c build/appliances/i386/fedora/11/back-end/raw/back-end.yum.conf list available
jboss-as6 jboss-as6-cloud-profiles java-1.6.0-openjdk bash kernel grub e2fsprogs passwd polycoreutils chkconfig
rootfiles yum vim-minimal acpid dhclient iputils generic-logos openssh-server openssh-clients mkinitrd cirras-
management rhq-agent which sudo ruby-devel make gcc-c++ wget --nevra --archlist=i386,i486,i586,i686,noarch'
```

...time passes...

Build

- Figure out the full set of RPMs
- Grab (and cache) them all
- Create a disk image, install them all
- Perform any post-install configuration

Pipeline



...and the build finishes

```
.....  
.....  
INFO -- : Base image for back-end appliance was built successfully.  
DEBUG -- : Operating system plugin executed.  
DEBUG -- : No platform selected, skipping platform conversion.  
DEBUG -- : No delivery method selected, skipping delivering.
```




But I use **VMware!**

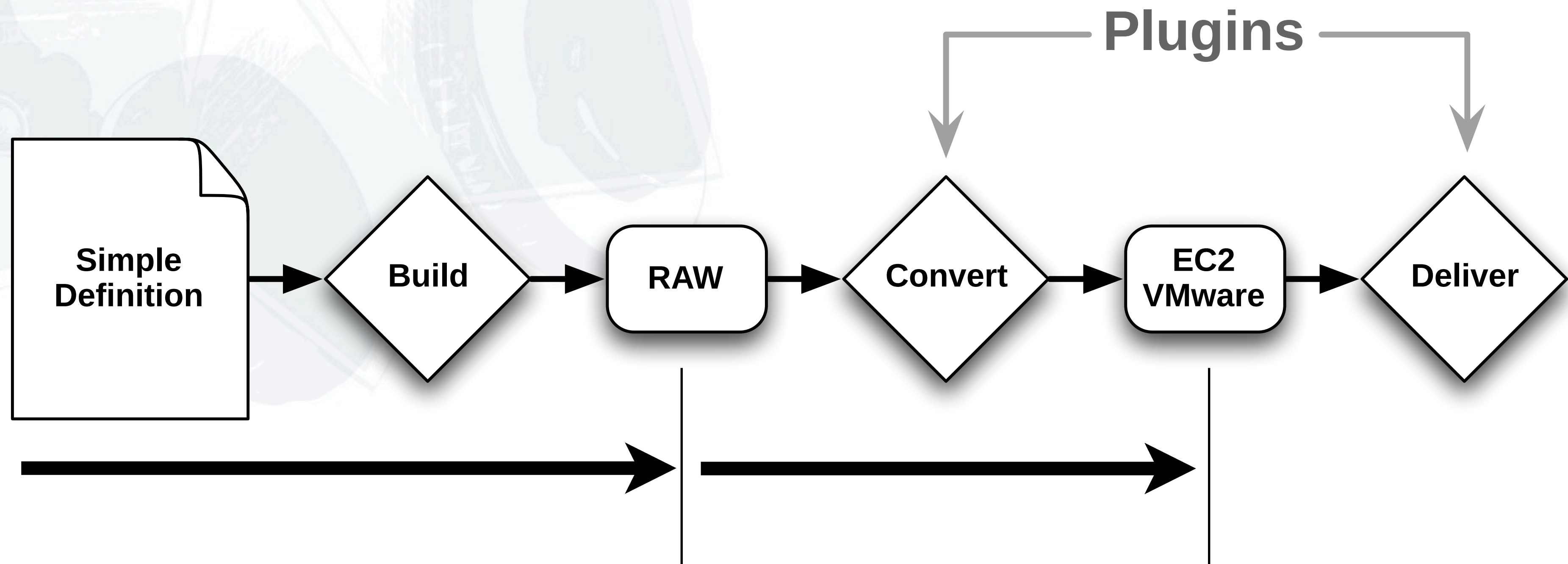
Do it some more!

```
$ boxgrinder-build -V \  
  ../cirras/appliances/back-end.appl \  
  -p vmware
```

```
D, [2010-06-18T20:39:00.931972 #7665] DEBUG -- : Reading definition from '../cirras/appliances/back-end.appl' file...  
D, [2010-06-18T20:39:00.934336 #7665] DEBUG -- : Reading definition from '../cirras/appliances/cirras.appl' file...  
I, [2010-06-18T20:39:00.939194 #7665] INFO -- : Deliverables for fedora operating system plugin exists, skipping.  
D, [2010-06-18T20:39:00.940075 #7665] DEBUG -- : Executing platform plugin for vmware...  
I, [2010-06-18T20:39:00.940689 #7665] INFO -- : Converting image to VMware format...  
D, [2010-06-18T20:39:00.941295 #7665] DEBUG -- : Copying VMware image file, this may take several minutes...
```

...time passes...

Pipeline



...and the conversion finishes

```
DEBUG -- : Building VMware enterprise image.  
DEBUG -- : VMware enterprise image was built.  
DEBUG -- : Building VMware personal image.  
DEBUG -- : VMware personal image was built.  
INFO -- : Image converted to VMware format.  
DEBUG -- : Platform plugin executed.  
DEBUG -- : No delivery method selected, skipping delivering.
```


Conversion

- Converts disk formats
- Converts/synthesize VM metadata
- Applies platform-specific changes
 - add/remove packages



Wait, I use **EC2**.

EC2 Conversion

```
$ boxgrinder-build -V \  
  ../cirras/appliances/back-end.appl \  
  -p ec2
```

```
D, [2010-06-18T20:56:30.934009 #7707] DEBUG -- : Reading definition from '../cirras/appliances/back-end.appl' file...  
D, [2010-06-18T20:56:30.946411 #7707] DEBUG -- : Reading definition from '../cirras/appliances/cirras.appl' file...  
I, [2010-06-18T20:56:30.951350 #7707] INFO -- : Deliverables for fedora operating system plugin exists, skipping.  
D, [2010-06-18T20:56:30.952646 #7707] DEBUG -- : Executing platform plugin for ec2...  
I, [2010-06-18T20:56:30.958164 #7707] INFO -- : Converting back-end appliance image to EC2 format...  
D, [2010-06-18T20:56:30.958856 #7707] DEBUG -- : Preparing disk for EC2 image...
```

...time passes...

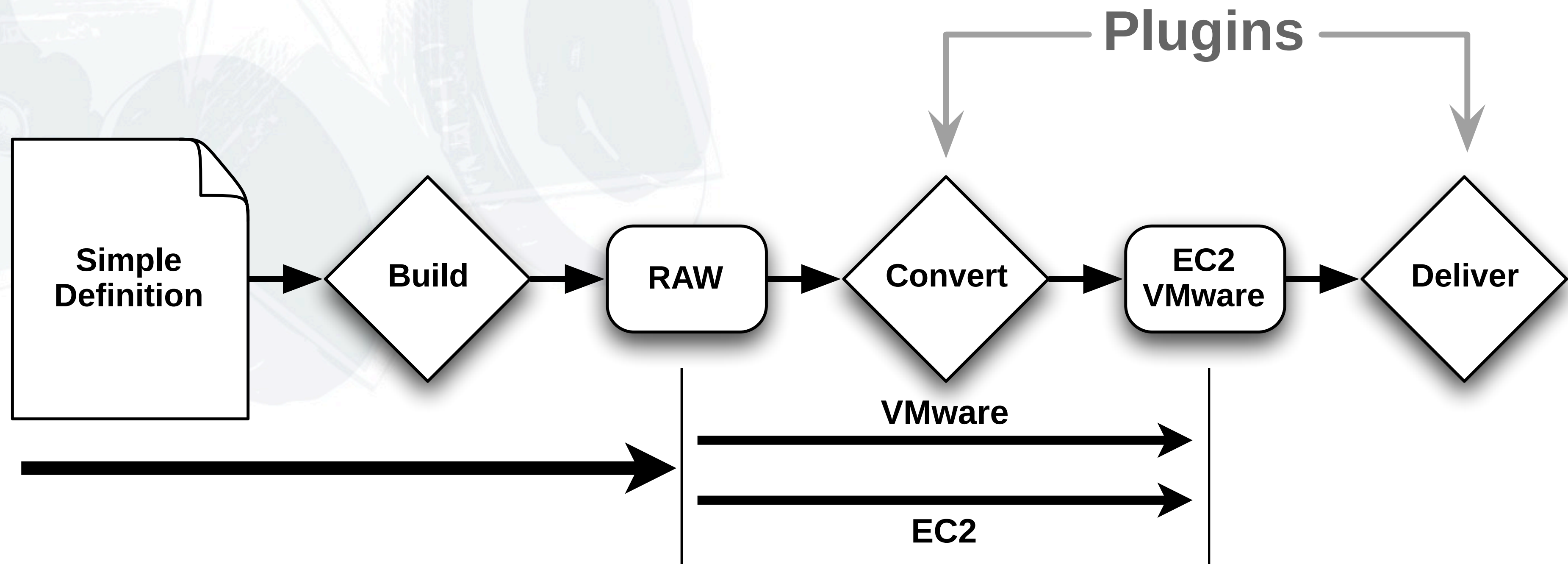
EC2 requires special **Xen kernels**
and **AMI tools** not present in typical
RPM repositories

```
DEBUG -- : Installing additional packages  
(kernel-xen-2.6.21.7-2.fc8.i686.rpm,  
ec2-ami-tools.noarch.rpm)...
```


And it finishes conversion

```
INFO -- : Image converted to EC2 format.  
DEBUG -- : Platform plugin executed.  
DEBUG -- : No delivery method selected, skipping delivering.
```


Pipeline





Now you have a **useless**
EC2 image on your local disk.

F'awesome!

Amazon Credentials

\$HOME/.boxgrinder/plugins/s3:

```
bucket: stormgrind-test
access_key: 1JF8xxxxxxxxxx
secret_access_key: TRVRfko1vxxxxxxxxxxxxxxxxxxxxxxxxxx
account_number: 6010-xxxx-xxxx
cert_file: ~/.ec2/cert-LC42AGGJxxxxxxxx.pem
key_file: ~/.ec2/pk-LC42AGGJxxxxxxxx.pem
```


Amazon Credentials

\$HOME/.boxgrinder/plugins/s3:

```
bucket: stormgrind-test
```

```
access_key: 1JF8xxxxxxxxxx
```

```
secret_access_key: TRVRfko1vxxxxxxxxxxxxxxxxxxxxxxxxxx
```

```
account_number: 6010-xxxx-xxxx
```

```
cert_file: ~/.ec2/cert-LC42AGGJxxxxxxxx.pem
```

```
key_file: ~/.ec2/pk-LC42AGGJxxxxxxxx.pem
```


Amazon Credentials

\$HOME/.boxgrinder/plugins/s3:

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access_key: 1JF8xxxxxxxxxx

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cert_file: ~/.ec2/cert-LC42AGGJxxxxxxxx.pem

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Amazon Credentials

\$HOME/.boxgrinder/plugins/s3:

bucket: stormgrind-test

access_key: 1JF8xxxxxxxxxx

secret_access_key: TRVRfko1vxxxxxxxxxxxxxxxxxxxxxxxxxx

account_number: 6010-xxxx-xxxx

cert_file: ~/.ec2/cert-LC42AGGJxxxxxxxx.pem

key_file: ~/.ec2/pk-LC42AGGJxxxxxxxx.pem

...and deliver it!

```
$ boxgrinder-build -V \  
  ../cirras/appliances/back-end.appl \  
  -p ec2 -d ami
```

```
D, [2010-06-18T21:17:40.469872 #7913] DEBUG -- : Reading definition from '../cirras/appliances/back-end.appl' file...  
D, [2010-06-18T21:17:40.480562 #7913] DEBUG -- : Reading definition from '../cirras/appliances/cirras.appl' file...  
I, [2010-06-18T21:17:40.485056 #7913] INFO -- : Deliverables for fedora operating system plugin exists, skipping.  
I, [2010-06-18T21:17:40.485794 #7913] INFO -- : Deliverables for ec2 platform plugin exists, skipping.  
D, [2010-06-18T21:17:40.486385 #7913] DEBUG -- : Reading configuration file for BoxGrinder::S3Plugin.
```

...time passes...

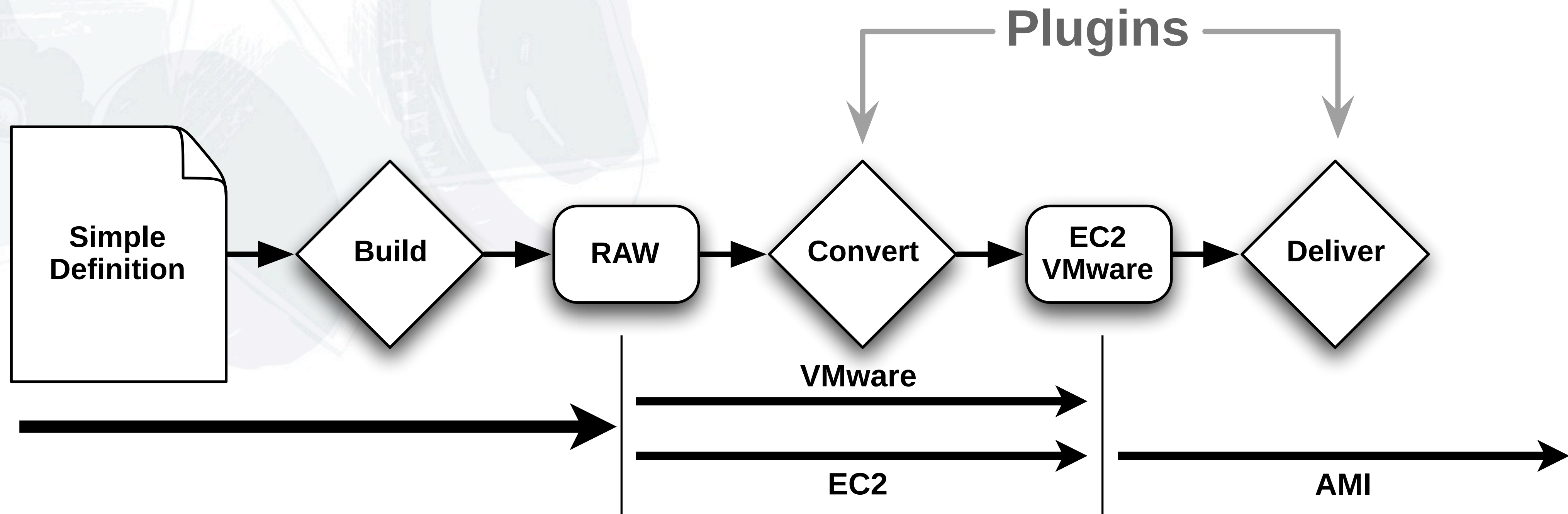
...and deliver it!

```
DEBUG -- : Executing command: 'ec2-bundle-  
image -i build/appliances/i386/fedora/11/back-  
end/ec2/back-end.ec2 --kernel aki-a71cf9ce --  
ramdisk ari-a51cf9cc
```

ec2-upload-bundle

...more time passes...

Pipeline





and *finally*...

Image successfully registered under id: ami-XXXXX.

AWS Management Console

https://console.aws.amazon.com/s3/home

aws.amazon.com | AWS | Products | Developers | Community | Support | Account | Welcome, Odd Thesis Team | Sign Out

Amazon S3 | Amazon EC2 | Amazon Elastic MapReduce | Amazon CloudFront | Amazon RDS

Buckets

- Create Bucket
- Actions
- bobmcwhirter-ct-demo
- boxgrinder
- boxgrinder-eu
- boxgrinder-releases
- boxgrinder-test
- cirras
- cirras-cluster
- cirras-eu
- cirras-releases
- jboss-cloud
- jboss-cloud-releases
- jim-test
- oddthesis
- stormfolio
- stormfolio-releases

Objects and Folders

Upload | Create Folder | Actions | Refresh | Properties | Transfers | Help

stormgrind-test > back-end > 1.1 > i386

Name	Size	Last Modified
back-end.ec2.manifest.xml	8.7 kb	Fri Jun 18 18:36:16 GMT-400 2010
back-end.ec2.part.00	10 mb	Fri Jun 18 17:07:47 GMT-400 2010
back-end.ec2.part.01	10 mb	Fri Jun 18 17:09:26 GMT-400 2010
back-end.ec2.part.02	10 mb	Fri Jun 18 17:11:04 GMT-400 2010
back-end.ec2.part.03	10 mb	Fri Jun 18 17:12:43 GMT-400 2010
back-end.ec2.part.04	10 mb	Fri Jun 18 17:14:25 GMT-400 2010
back-end.ec2.part.05	10 mb	Fri Jun 18 17:16:08 GMT-400 2010
back-end.ec2.part.06	10 mb	Fri Jun 18 17:17:46 GMT-400 2010
back-end.ec2.part.07	10 mb	Fri Jun 18 17:19:25 GMT-400 2010
back-end.ec2.part.08	10 mb	Fri Jun 18 17:22:11 GMT-400 2010
back-end.ec2.part.09	10 mb	Fri Jun 18 17:23:50 GMT-400 2010
back-end.ec2.part.10	10 mb	Fri Jun 18 17:26:09 GMT-400 2010
back-end.ec2.part.11	10 mb	Fri Jun 18 17:28:07 GMT-400 2010

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AWS Management Console

https://console.aws.amazon.com/ec2/home#c=EC2&s=Images

AWS Management Console

aws.amazon.com | AWS | Products | Developers | Community | Support | Account | Welcome, Odd Thesis Team | Settings | Sign Out

Amazon S3 | **Amazon EC2** | Amazon Elastic MapReduce | Amazon CloudFront | Amazon RDS

Navigation

Region: US East

> **EC2 Dashboard**

INSTANCES

> Instances

> Spot Requests

IMAGES

> **AMIs**

> Bundle Tasks

ELASTIC BLOCK STORE

> Volumes

> Snapshots

NETWORKING & SECURITY

> Elastic IPs

> Security Groups

> Key Pairs

> Load Balancers

Amazon Machine Images

Launch | Spot Request | Register New AMI | De-register | Permissions | Show/Hide | Refresh | Help

Viewing: Owned By Me | All Platforms | 1 to 50 of 84 AMIs

	AMI ID	Source	Owner	Visibility	Status
<input type="checkbox"/>	ami-0b4fa662	stormgrind-test/images/back-end/1.0/i386/back-end.ec2.manifest.xml	601083040030	Private	Available
<input type="checkbox"/>	ami-0b6e8f62	oddthesis/jboss-4.2.2.GA-i386-ec2	601083040030	Public	Available
<input type="checkbox"/>	ami-116c8d78	oddthesis/jboss-4.2.2.GA-i386-ec2	601083040030	Public	Available
<input type="checkbox"/>	ami-1702ee7e	stormfolio/stormgrind-test/images/back-end/1.0/i386/back-end.ec2.manifest.xml	601083040030	Public	Available
<input type="checkbox"/>	ami-176d8c7e	oddthesis/jboss-4.2.2.GA-i386-ec2	601083040030	Public	Available
<input type="checkbox"/>	ami-17e0007e	oddthesis/jboss-4.2.2.GA-i386-ec2	601083040030	Public	Available
<input type="checkbox"/>	ami-18e40c71	stormgrind-test/images/back-end/1.0/i386/back-end.ec2.manifest.xml	601083040030	Private	Available
<input type="checkbox"/>	ami-2054b649	boxgrinder/cirras/1.0.0.Beta1/i386/management/management.ec2.manifest.xml	601083040030	Public	Available
<input type="checkbox"/>	ami-2741ad4e	cirras/1.0.0.Beta2/i386/management/management.ec2.manifest.xml	601083040030	Public	Available
<input type="checkbox"/>	ami-2749a54e	cirras/1.0.0.Beta2/i386/front-end/front-end.ec2.manifest.xml	601083040030	Public	Available

0 EC2 Amazon Machine Images selected

Select an image above

© 2008 - 2009, Amazon Web Services LLC or its affiliates. All right reserved. | Feedback | Support | Privacy Policy | Terms of Use | An amazon.com company

Go to "https://console.aws.amazon.com/ec2/yui-dt7-href-imageLocation"

Notes...

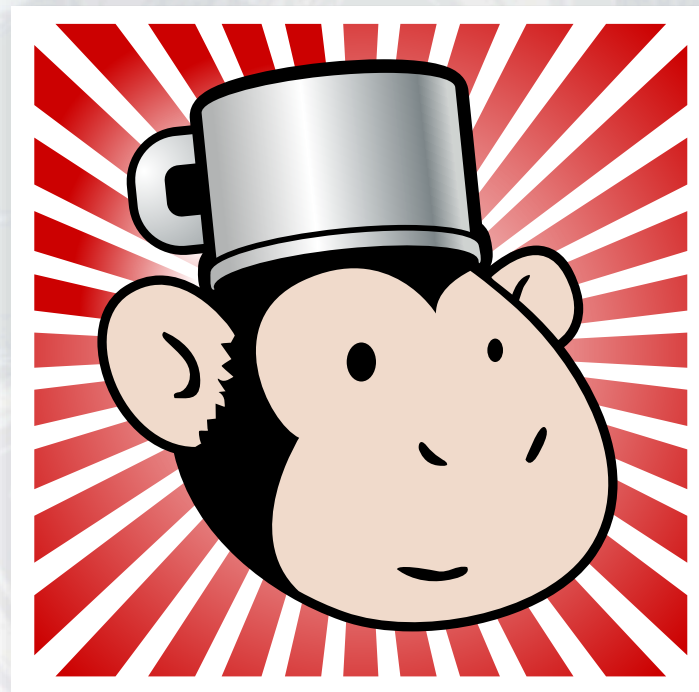
- If you're building for EC2, start with a meta-appliance on EC2. **Uploading across the WAN sucks hard.**
- Architecture of host must match the architecture of appliances being built.

Wait, what?

Architecture of the host must match the architecture of the appliances being built.

x86_64

i386



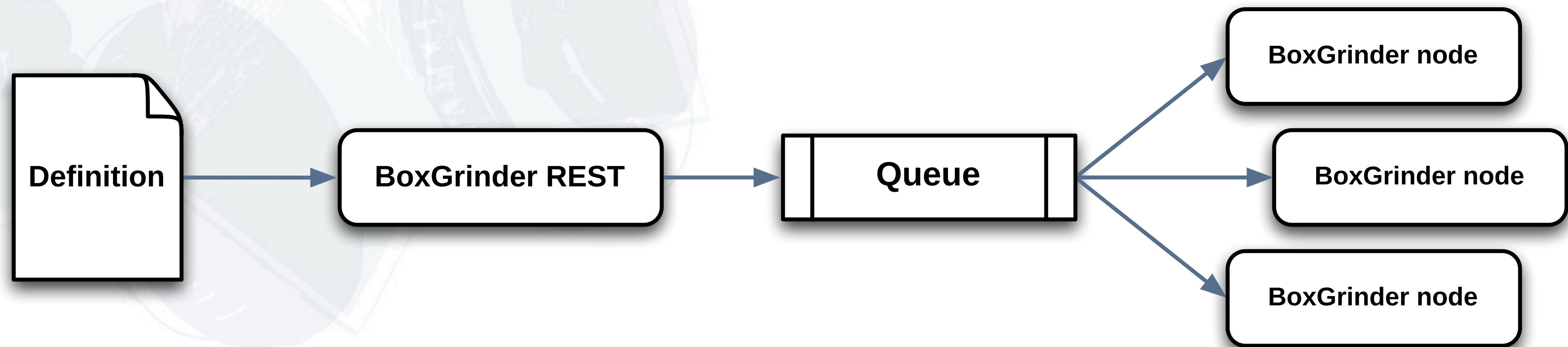
BoxGrinder

REST

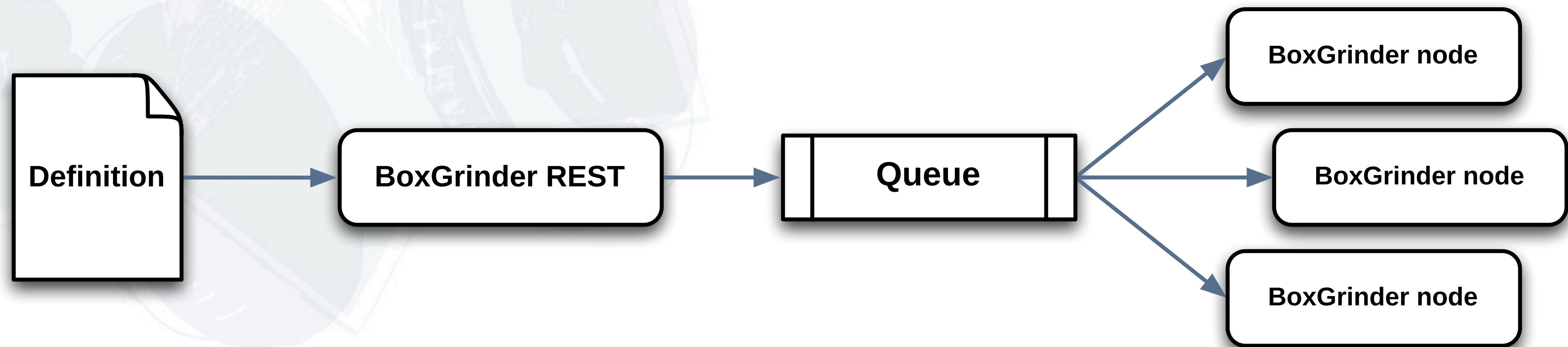


RESTful API for driving farms
of BoxGrinder-Build nodes.

BoxGrinder-REST



BoxGrinder-REST



Runs on **TorqueBox**, using **HornetQ**

BoxGrinder-REST

- Queue per each supported platform
- Multiple builders per queue possible
- Builders launching on-demand soon
 - Using Deltacloud
- Supports for multiple conversions
- Supports multiple deliveries

BoxGrinder-REST

- Command-line interface
- Web Client (BoxGrinder-Studio?)
- IDE integration (JBoss Tools?)

Currently Supports

OS

RHEL 5

Fedora 11-13

Arch

x86_64

i386

Hypervisor

KVM

Xen

VMware personal

VMware enterprise

Amazon EC2

Delivery

Local

SFTP

S3

CloudFront

AMI



Thanks!



Q&A

Resources

<http://github.com/stormgrind/> # Code
<http://jboss.org/stormgrind/> # Projects
<http://cloudpress.org/> # Blog

#stormgrind

IRC

@stormgrind
@marekgoldmann
@bobmcwhirter

Twitter