



# HOW CLOUD COMPILING™ WORKS

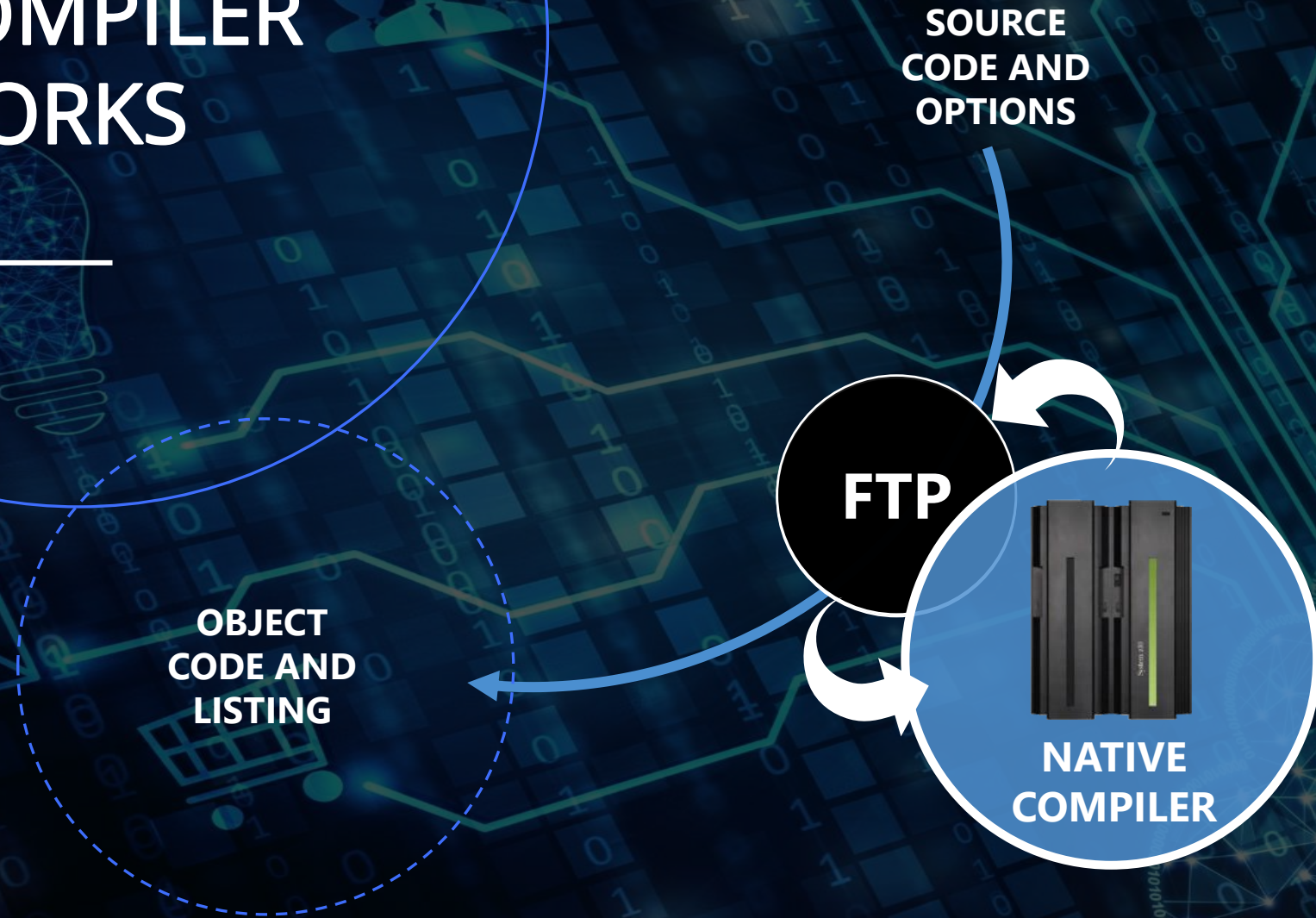
# ANY COMPILER IS A BLACK BOX

SOURCE  
CODE AND  
OPTIONS

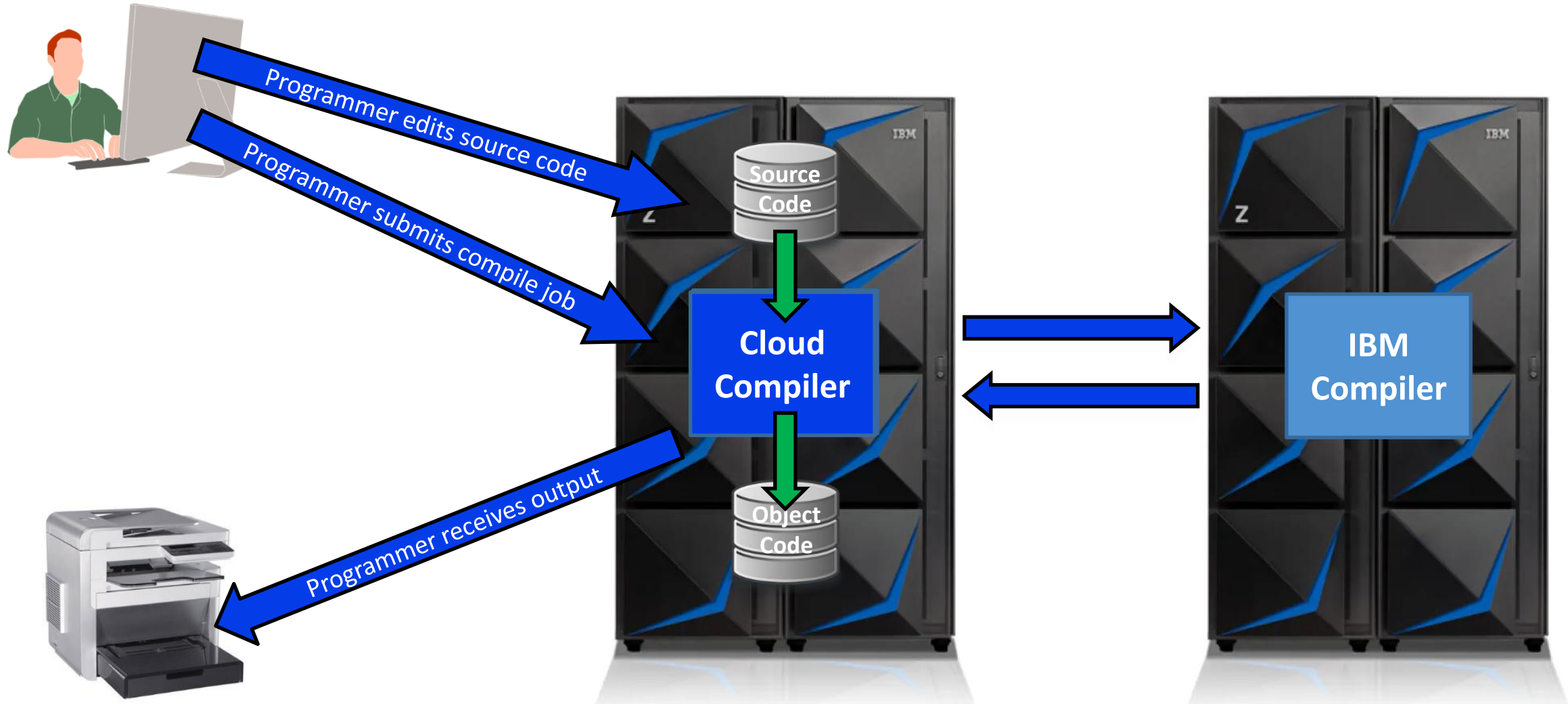
OBJECT  
CODE AND  
LISTING



# HOW A CLOUD COMPILER WORKS

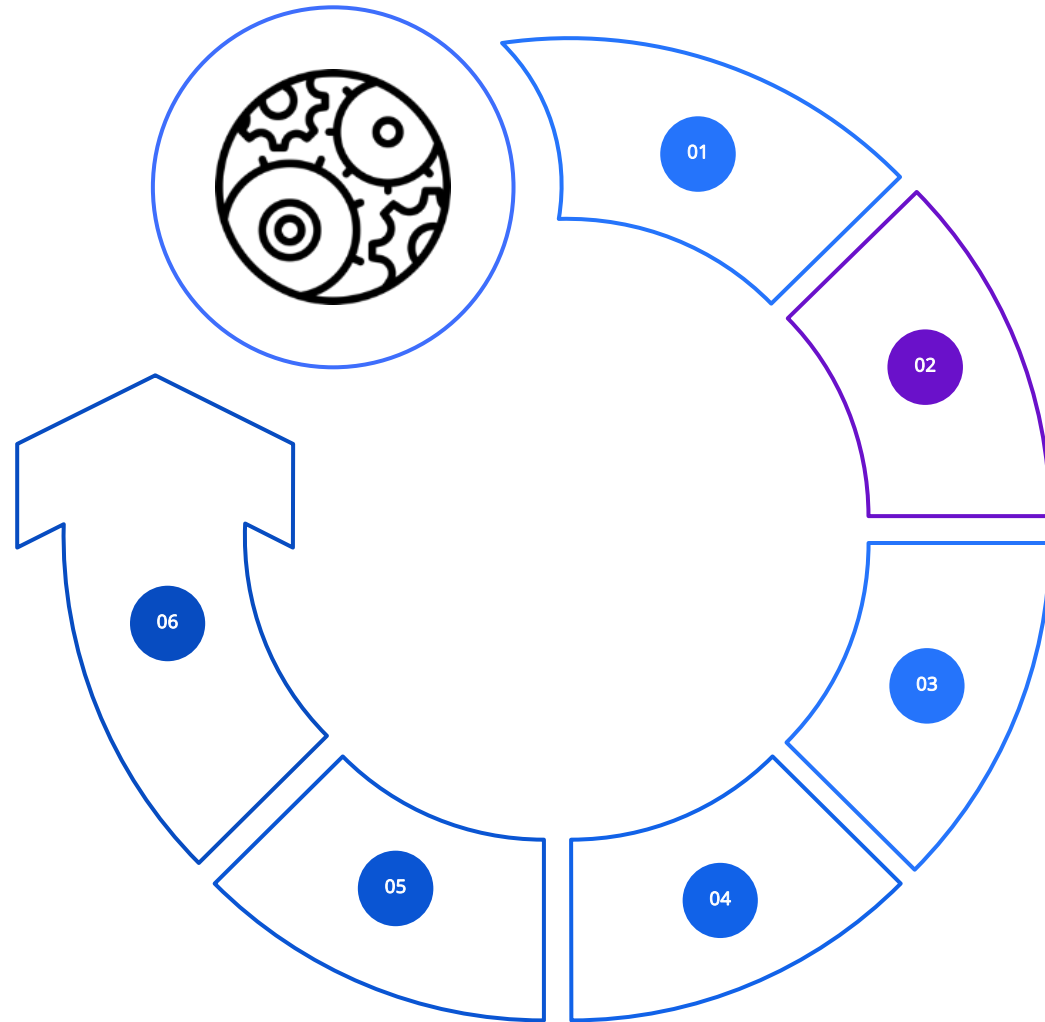


# TRANSPARENCY – No Change for Your Programmers



# HOW CLOUD COMPILING™ WORKS

- 01 Analyzes environment: DD's, PARM=, etc.
- 02 Reads through source code
- 03 FTPs source code to target system
- 04 Builds a new compile job and uses FTP to submit
- 05 After job completes FTPs object code and listing back
- 06 Note does not “move the job from one JES to another” or anything like that
  - Does not require JESPLEX or close coupling
  - Only requires an FTP (TCP/IP) link
  - Supports mixed JES2/JES3 environment



# A TOTALLY NEW JOB

```
//XBC001D JOB (),'CHARLES MILLS',MSGCLASS=H,REGION=0M
/** Generated by Cloud Compiler PLIOPTV2 V3R0.0 at 14:21:53 on 7/15/2010
/** on behalf of job/step RDC001A(JOB05072)/CLOUDCMP on node TESTJES
//PLIOPTV2 EXEC PGM=IEL0AA,COND=(0,NE),REGION=4M,
// PARM=('SIZE(1000K),MARGINS(2,72),X,NOBJ,DECK')
//STEPLIB DD DISP=SHR,DSN=PLI230.PLICOMP
//SYSIN DD DISP=(OLD,DELETE),
// DSN=XBC001.TCCFILES.XBC001D.FHM92JZA.SYSIN
//SYSLIB DD DISP=(OLD,DELETE),
// DSN=XBC001.TCCFILES.XBC001D.FHM92JZA.SYSLIB
//SYSPRINT DD BLKSIZE=0,DISP=(NEW,CATLG),
// DSN=XBC001.TCCFILES.XBC001D.FHM92JZA.SYSPRINT,DSORG=PS,LRECL=133,
// RECFM=FBA,SPACE=(CYL,(1,1,0))
//SYSPUNCH DD BLKSIZE=0,DISP=(NEW,CATLG),
// DSN=XBC001.TCCFILES.XBC001D.FHM92JZA.SYSPUNCH,DSORG=PS,LRECL=80,
// RECFM=FB,SPACE=(TRK,(5,10,0))
//SYSUT1 DD SPACE=(CYL,(2,2,0)),UNIT=SYSDA
```

# WHAT ABOUT ...

What about changing our JCL and PROCs?

What about COPY and INCLUDE?

What about the \_\_\_\_\_ compiler option?

What about network outages?

What about IBM licensing?

What about the link editor?

What about CA-Endevor and Xpediter?

What about the DB2 and CICS pre-compilers?

What about the load on our network?

What about compiler customization?

What about security?

# WHAT ABOUT CHANGING OUR JCL AND PROCs?

- ✓ No JCL or PROC changes
- ✓ We simply alias the Cloud Compiler so it gets loaded instead of the IBM compiler
- ✓ Works with programmer JCL as well as products that call the compiler under the covers
- ✓ No operating system “hooks”
- ✓ Easily reversible if desired



# WHAT ABOUT COPY AND INCLUDE?

- ✓ Cloud compiler parses source code COPY or INCLUDE (as appropriate to language)
- ✓ FTPs relevant members and builds remote SYSLIB
- ✓ No source code **stored** on compile machine
  - No synchronization issues
- ✓ Handles default and "DD name" format
  - COPY member OF ddname
- ✓ Handles nested COPYs

# WHAT ABOUT THE \_\_\_\_\_ COMPILER OPTION?



Short answer: **“no problem”**



Longer answer

- Enterprise COBOL supports 59 options
  - ADATA, ADV, ARITH, AWO, BUFSIZE, ...
- We care about 13 of them
  - ADATA means need to process SYSADATA
  - DECK means need to process SYSPUNCH
  - LIB means need to scan source code for COPY
  - Etc.
- ADV, ARITH, AWO, BUFSIZE, etc. mean nothing to us
- We pass them all to the compiler unmodified

# WHAT ABOUT NETWORK OUTAGES?

- ✓ Extensive diagnostics, FTP “deadman,” etc.
- ✓ Customizable retry count
- ✓ Ability to define multiple compile servers
  - Automated fall-back
- ✓ For single datacenter clouds, if network down programmers probably dead in the water anyway
- ✓ Enable Safe-Cloud™ feature if desired
  - Falls back to IBM compiler installed on same machine
  - Legal to leave installed and not pay so long as don't use
  - Safe-Cloud puts out audit message and you owe IBM for the month

# WHAT ABOUT IBM LICENSING?



## Private cloud

- IBM Licensing allows you to route all of your compiles to one machine



## Open cloud (Cloud Compiling™ SaaS)

- Our licenses with IBM permit compiles as a service
- No different than if your programmers used us as a service bureau

# WHAT ABOUT THE LINK EDITOR?

- ✓ Link editor/binder licensed with z/OS, not compilers
- ✓ Link edit/bind in normal way after compile
- ✓ Link editor/binder does not know/care where object code came from
  - Remember the black box analogy

# WHAT ABOUT CA ENDEVOR AND XPEDITER?

- ✓ They don't care
- ✓ Cloud compiler "looks just like" native compiler
  - Remember the black box analogy
  - They call an entry point and expect certain datasets to appear

# WHAT ABOUT DB2 AND CICS PRE-COMPILERS AND DB2 BIND?

- ✓ Licensed with DB2 and CICS, not compiler
- ✓ Run before or after cloud compiler just like native compiler
  - Remember the black box analogy
- ✓ Co-compiler requires DB2 or CICS installed on compile machine
  - Same version a good idea!
- ✓ You can always use the pre-compiler

# WHAT ABOUT THE LOAD ON OUR NETWORK?



Compile data volumes are surprisingly low

- Two to three megabytes is a large compile
- Like one medium-sized digital photograph



Benchmark COBOL compile: 5489 lines

- SYSPRINT: 21,431 lines or 2.8 MB
  - MAP option accounts for half of that
- .025 seconds – 25 milliseconds – over gigabit Ethernet
- Even less over HiperSockets



# WHAT ABOUT COMPILER CUSTOMIZATION?



“We have unique corporate compiler default options – will we lose them?”

- Customize exactly as now but on compile server mainframe



“We have two programming groups with different default options”

- Several ways to handle – documented in our manuals



Open cloud – multiple customers on our machine

- We have devised a way to handle multiple customizations

# WHAT ABOUT SECURITY?

- ✓ No APF Authorization Required
- ✓ No source code stored on compile machine
- ✓ Exists on compile machine for only a few seconds
  - `//SYSIN DD DISP=(OLD,DELETE),...`
  - Protected by RACF and ENQ'ed by z/OS
  - Cloud compiler uses FTP to delete if compile job totally fails
  - Unpredictable name like  
XCC001.TCCFILES.XCC001K.EORVA12U.SYSIN
- ✓ PassTickets
- ✓ Suggest defining userid with no TSO and limited dataset access
- ✓ Private Cloud
  - Just as secure as any other kind of compile
- ✓ Open Cloud
  - Secure technologies such as VPN, TLS, PassTickets, etc.

# PassTickets

## THE PROBLEMS

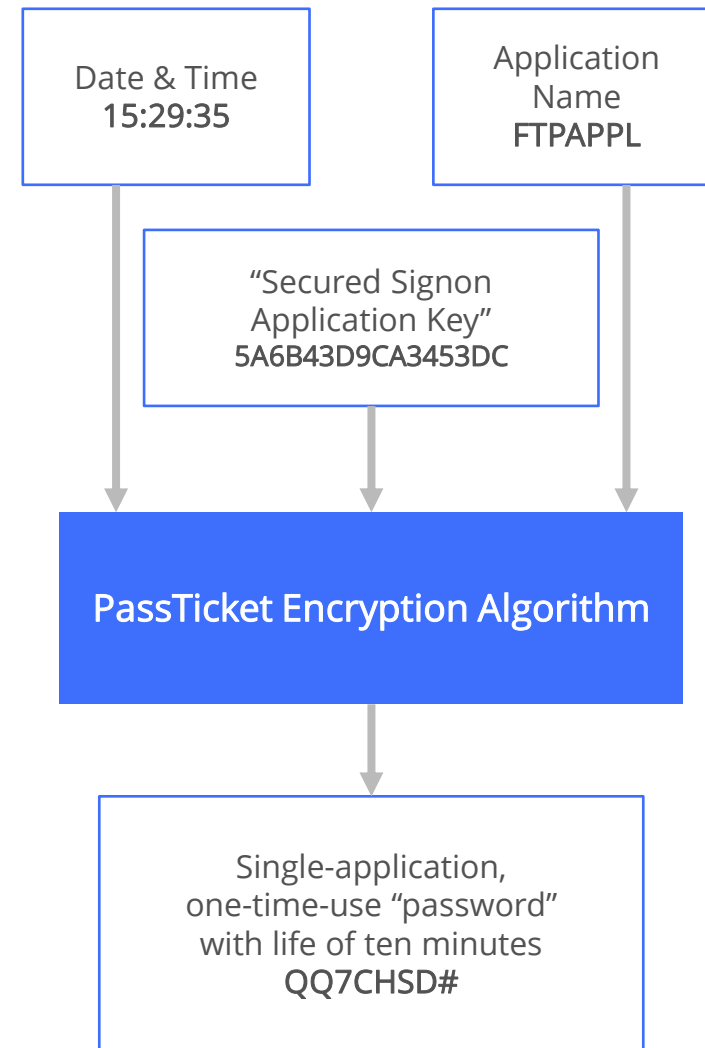
- FTP requires a password
- Don't want to transmit passwords over the network
- Don't want to – or auditors won't let us – store passwords
- Concern that access to one application may give access to others

## THE SOLUTION...

# PassTickets

## THE SOLUTION

- Exactly like a password ... but
  - No exposure in transmitting
  - No reason to store
  - Access to one application (FTP)
- Requires mainframe clocks set within a few minutes of each other (usually UTC)
- Was an absolute bear for us to figure out
- But now have “cookbook” in our manuals
- Yes, supported also by ACF2 and TopSecret



# THIS ALL SOUNDS COMPLICATED

- Don't mean to give the impression that using Cloud Compiling™ is complicated
- All of the things discussed happen automatically under the hood

SOURCE  
CODE AND  
OPTIONS



OBJECT  
CODE AND  
LISTING

# Streamlined and Preconfigured Proof of Concept Benefits...

Designed to let you run compiles in our actual Cloud Environment

Can Trial COBOL versions 4 and/or 6

POC is fully preconfigured no need for labor intensive install

Allows you to test actual MSU reductions to your environment

*\* POC is not designed for full production. Once you are ready for production we will ship new parameter file allowing full Cloud access. There is no need to reinstall*

# Actual Steps for Installing our POC...

1. Receive or Download zipped installation file from Cloud Compiling
2. Unzip on a PC or other workstation
3. Upload load module image and control files
4. Convert load module image to actual load module with TSO RECEIVE
5. If TLS is wanted, work with your certificate group and edit FTP.DATA to enable (we ship everything you need and give step-by-step instructions)
6. Run installation verification program and you are done!



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# THANK YOU

- Open Discussion

- Next Steps

