



Slides: 8bit.vg/gdc-ap or Vault

How to write an autopatcher for your game

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Founder, Archive Entertainment

About me



Archive
Entertainment

Microsoft[®]

CAPCOM[®]

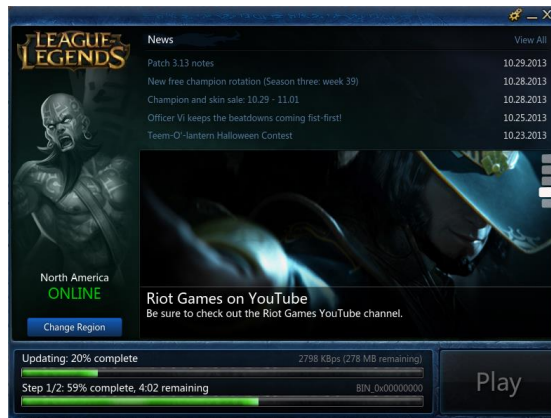
MD MIDWAY



My history with autoupdaters



What is an autopatcher / autoupdater?



Building the autopatcher

1. Simple Method
2. Manifest
3. Binary Diffs



Simple Method



Installed
Version Number



Installed Build



Client PC



Latest Stable
Version Number



Latest Stable
Build



Cloud Storage

Simple Method



Installed
Version Number



Installed Build



Client PC



Latest Stable
Version Number



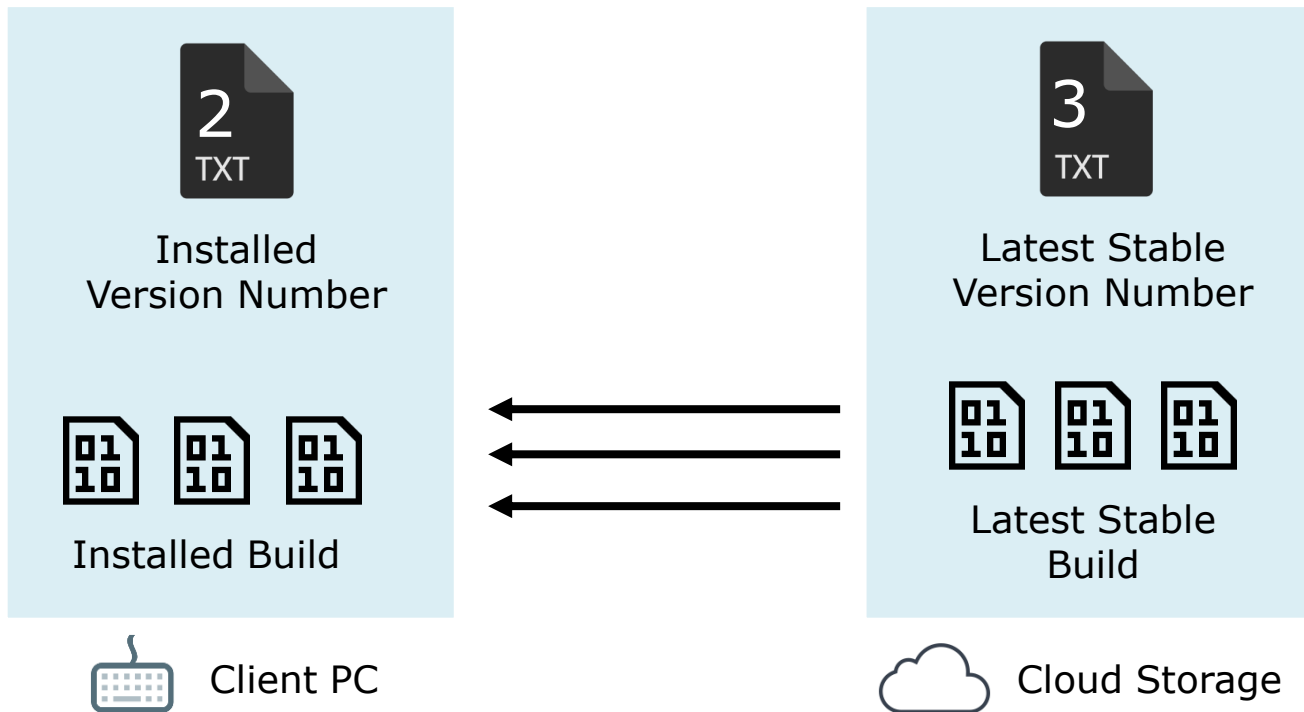
Latest Stable
Build



Cloud Storage



Simple Method



Simple Method



Installed
Version Number



Installed Build



Client PC



Latest Stable
Version Number



Latest Stable
Build



Cloud Storage



8BitMMO

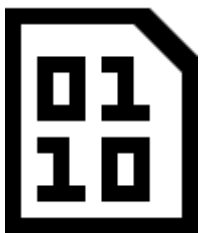


Manifest

```
{  
  "overallVersionNumber": 3,  
  "files": [  
    {  
      "filePath": "Game.exe",  
      "CRC": "A34293E0"  
    },  
    {  
      "filePath": "Assets/Texture1.png",  
      "CRC": "EC01F981"  
    },  
    {  
      "filePath": "Assets/Texture2.png",  
      "CRC": "03B28A6C"  
    }  
  ]  
}
```



Binary Diff



Binary Diff Tools

- VCDIFF / xdelta3
- bsdiff



Diff+Manifest Method



Installed
JSON Manifest



Installed Build



Client PC



REST API



Web Service



Patches + Full Files



Cloud Storage



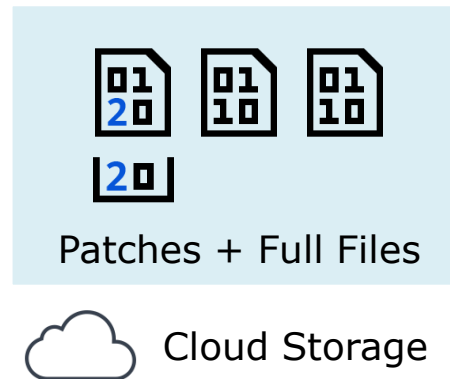
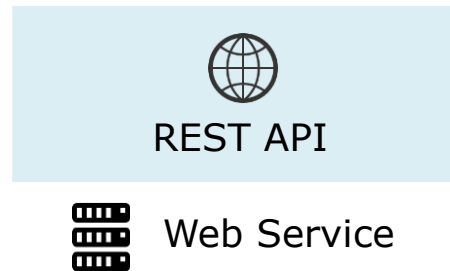
Diff+Manifest Method



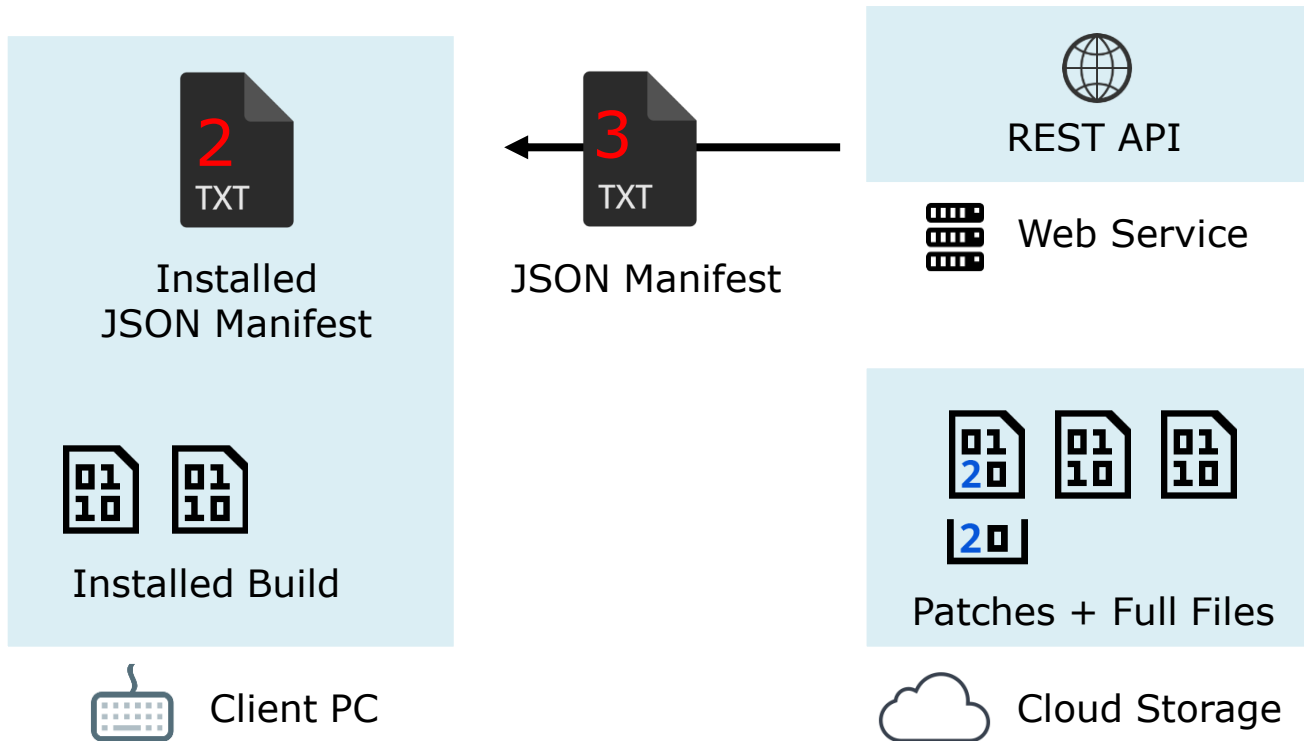
"We have v2,
How do I update?"

→

(HTTP)



Diff+Manifest Method

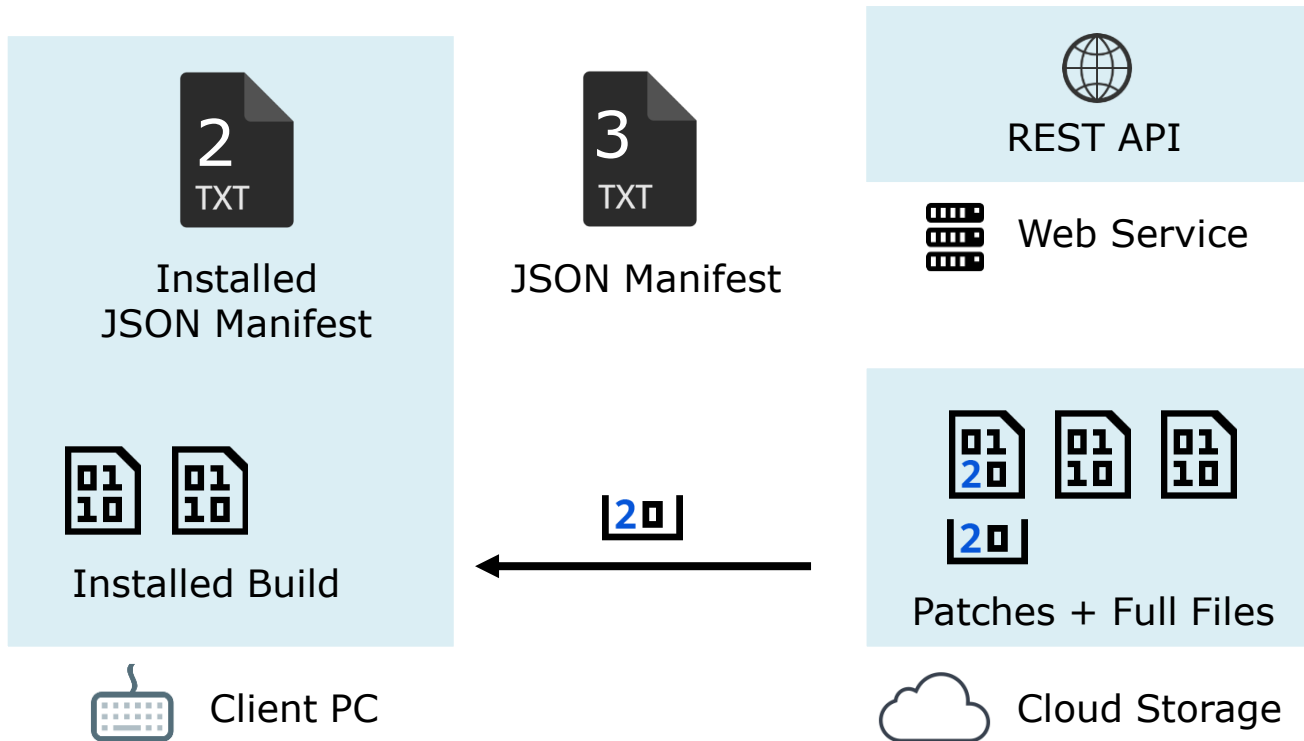


JSON Manifest

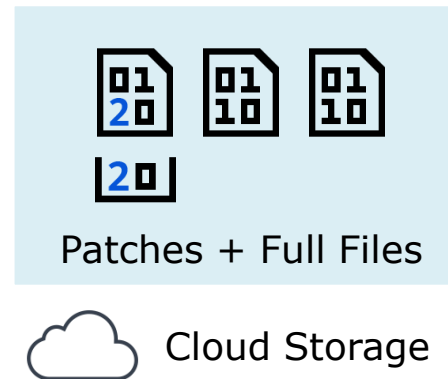
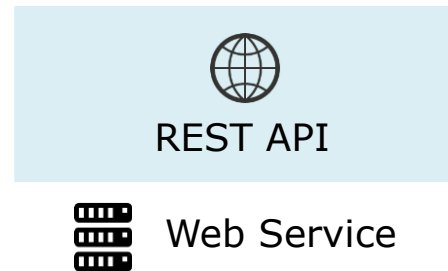
```
[
  {
    "fileID": 4,
    "filePath": "ModifiedGameFile.bin",
    "patch": {
      "blobID": 1942,
      "fromBuild": 2,
      "toBuild": 3,
      "filesize": 80949,
      "CRC": "23B4984D",
      "patchMethod": "bsdiff",
      "compression": "LZMA"
    },
    "full": {
      "blobID": 1940,
      "fromBuild": 0,
      "toBuild": 3,
      "filesize": 104647,
      "CRC": "CB91E AFF",
      "compression": "LZMA"
    },
    "wasDeleted": false,
    "unpackedCRC": "1B1CEABE",
    "latestRev": 3
  }, ...
]
```



Diff+Manifest Method



Diff+Manifest Method

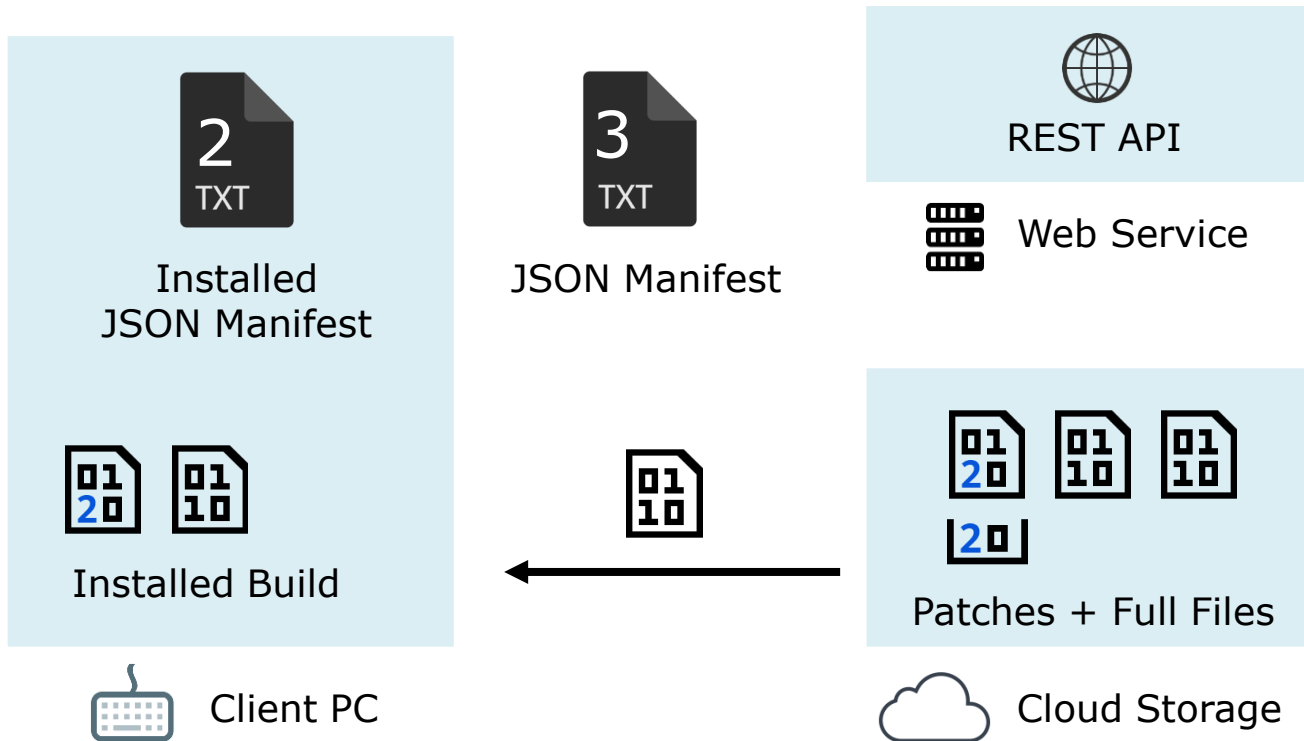


JSON Manifest

```
[ ...,  
  {  
    "fileID": 36,  
    "filePath": "NewFile.png",  
    "full": {  
      "blobID": 1424,  
      "fromBuild": 0,  
      "toBuild": 3,  
      "filesize": 17009,  
      "CRC": "D21C36CF",  
      "compression": "NONE"  
    },  
    "wasDeleted": false,  
    "unpackedCRC": "D21C36CF",  
    "latestRev": 3  
  }, ...  
]
```



Diff+Manifest Method



Diff+Manifest Method



Installed
JSON Manifest



Installed Build



Client PC



REST API



Web Service



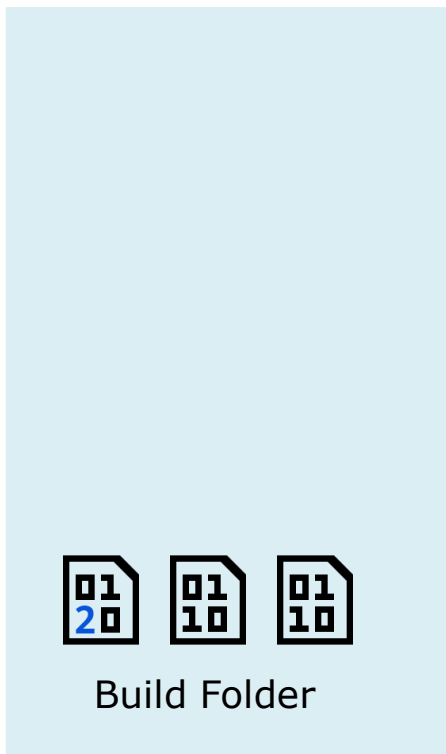
Patches + Full Files



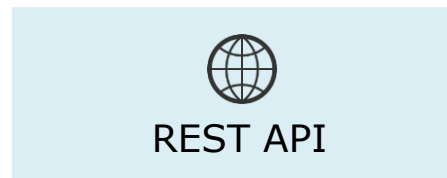
Cloud Storage



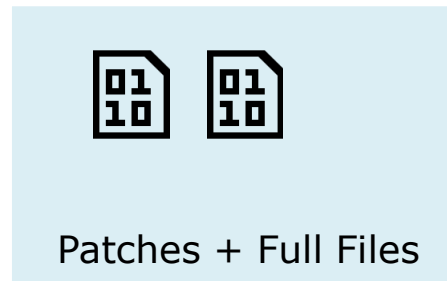
Manifest Generation



Developer PC



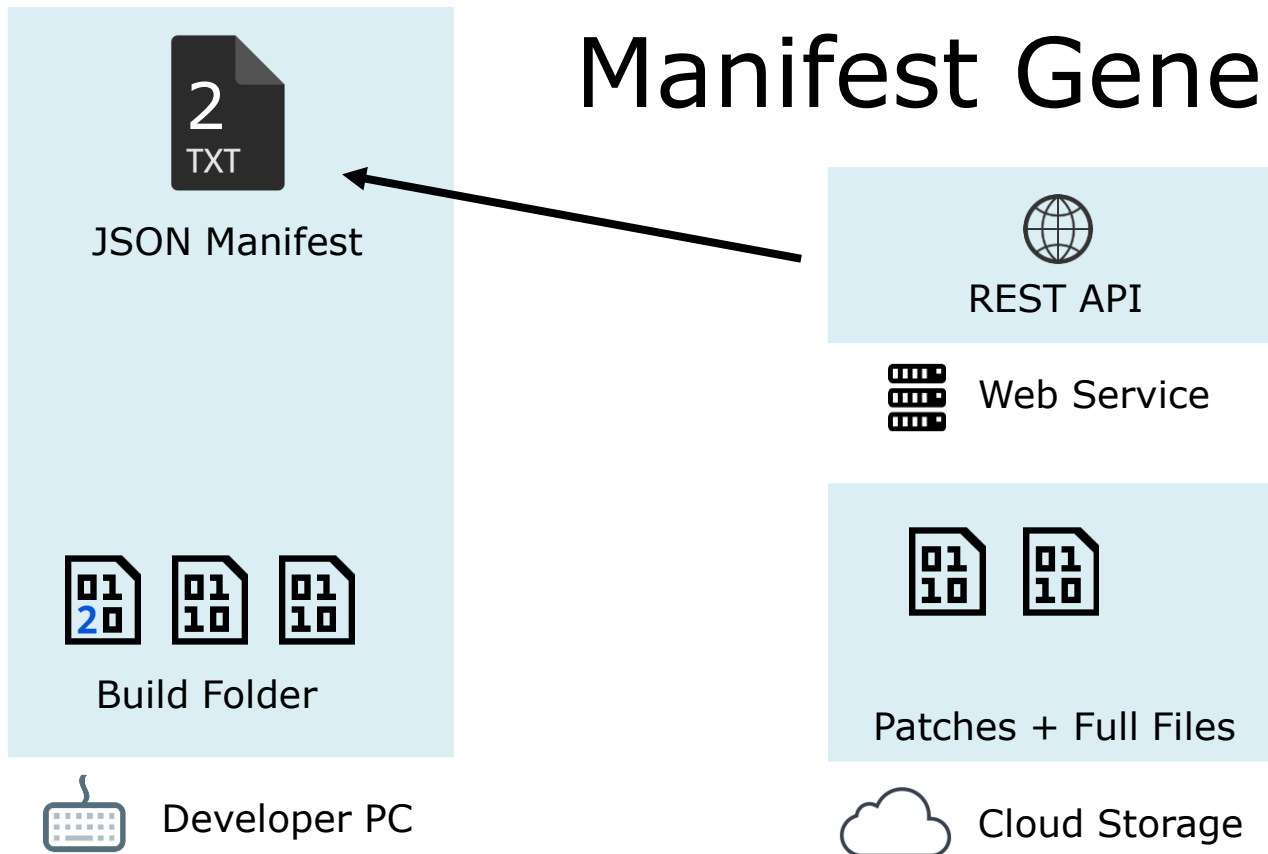
Web Service



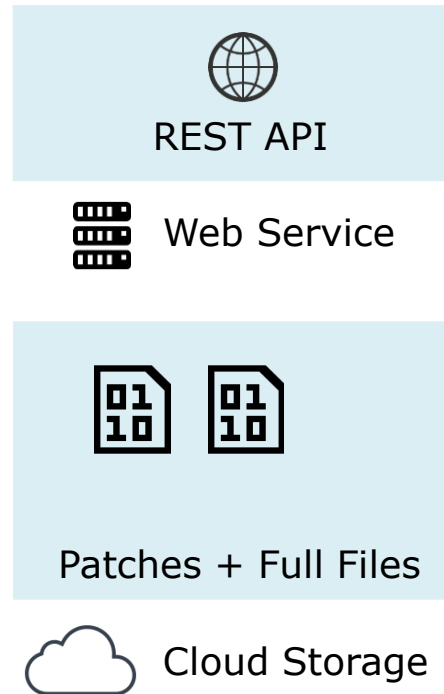
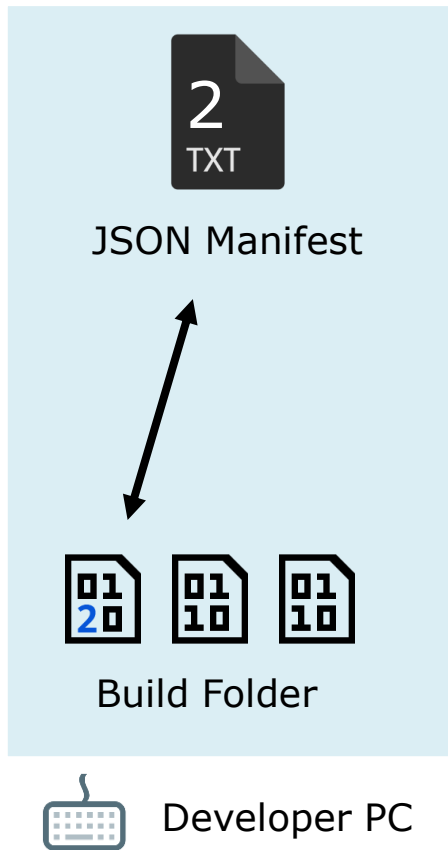
Cloud Storage



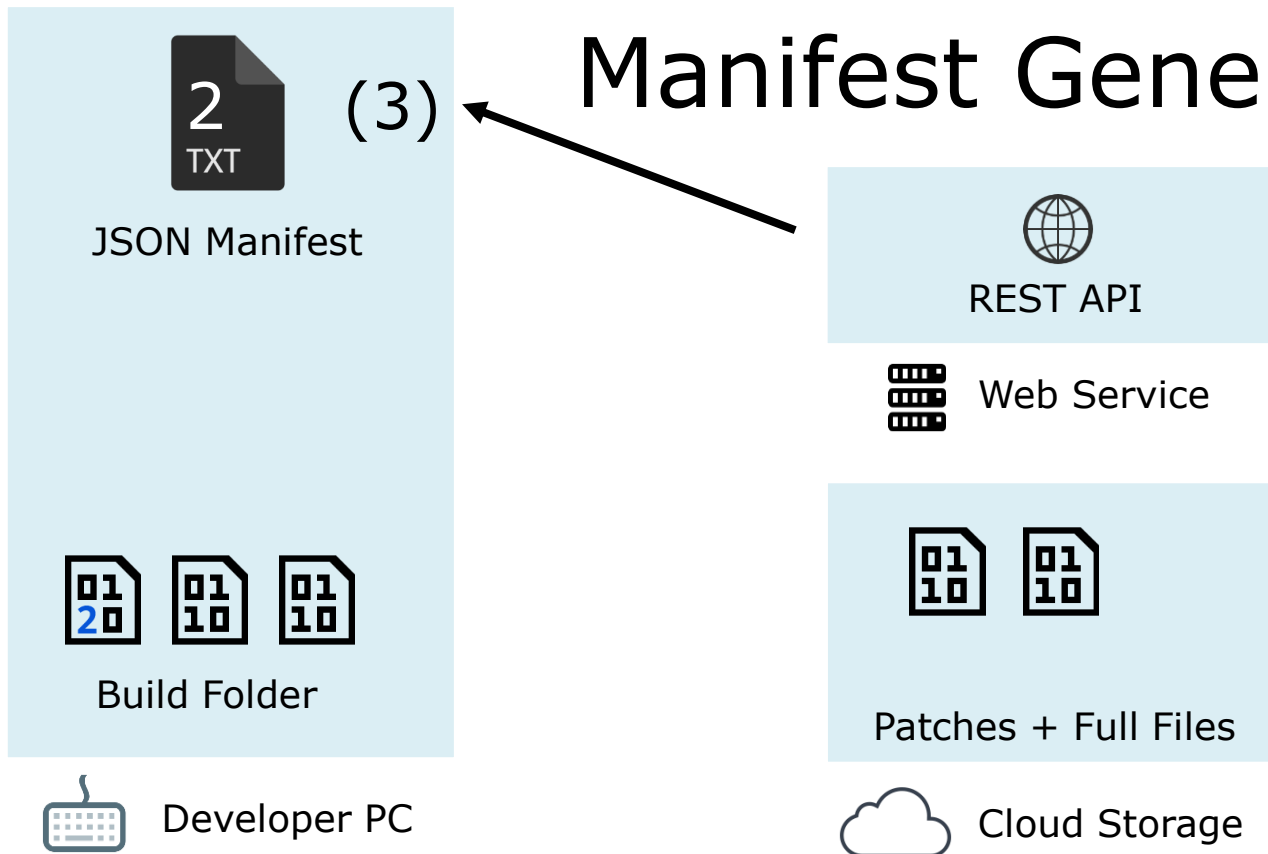
Manifest Generation

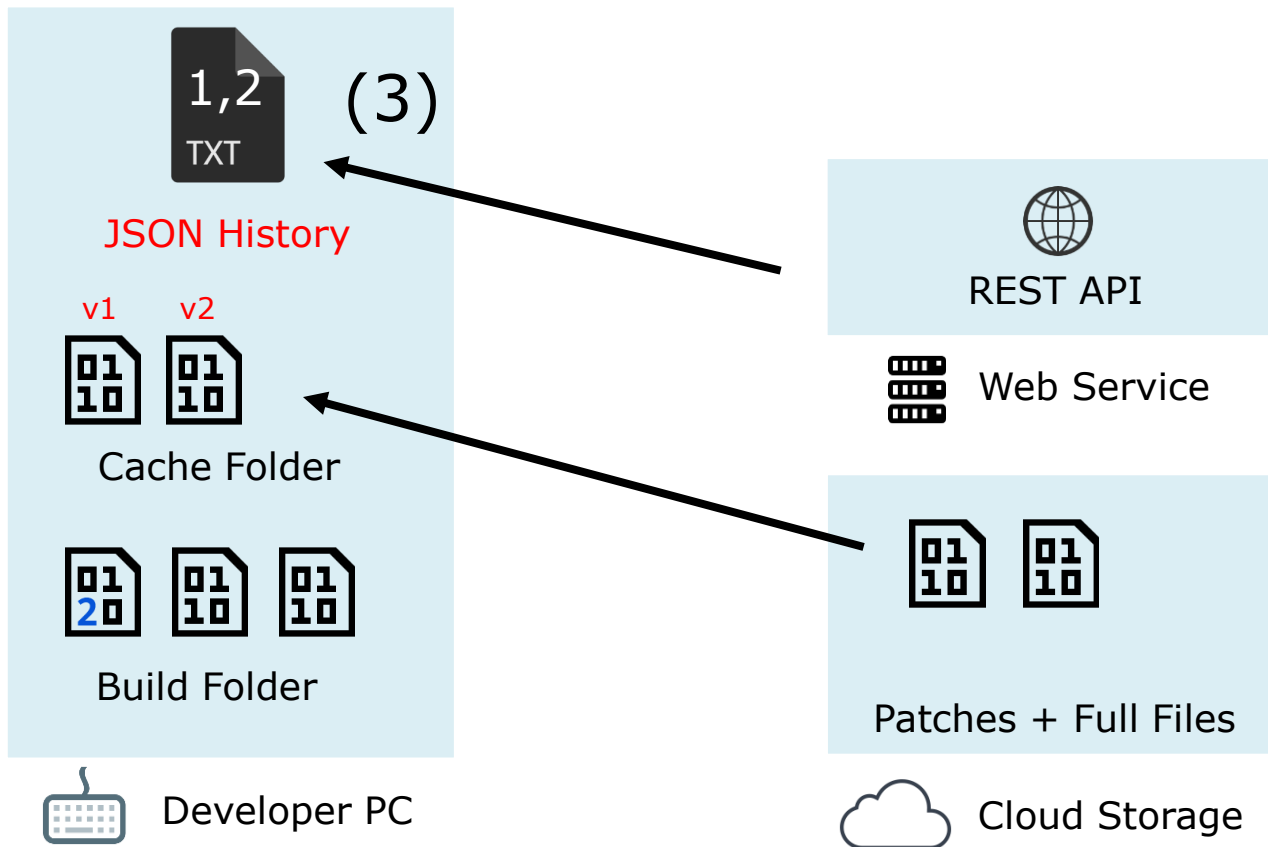


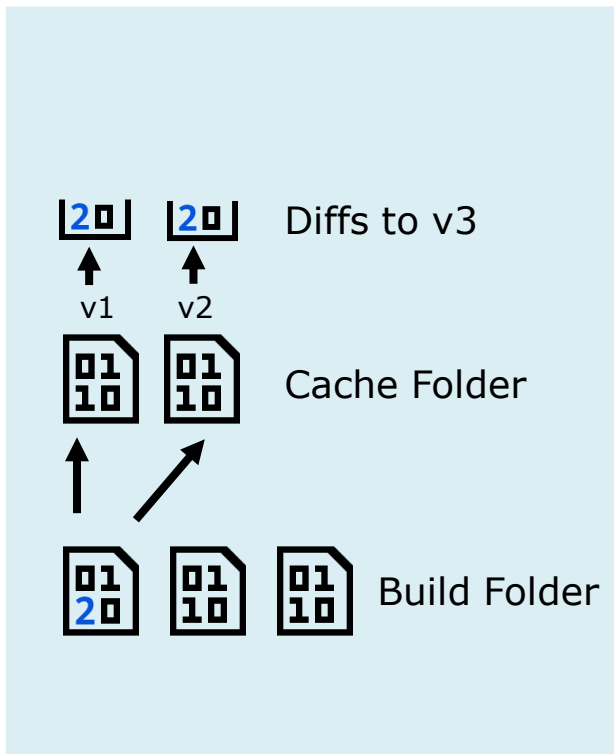
Manifest Generation



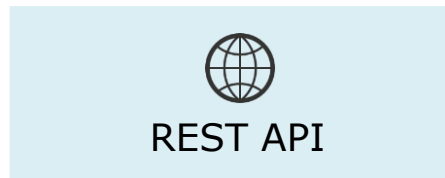
Manifest Generation



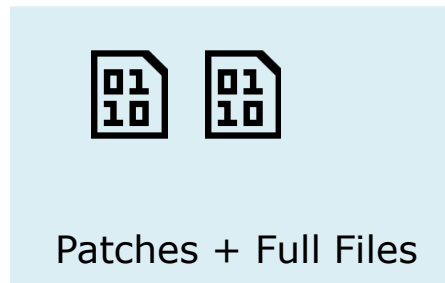




Developer PC

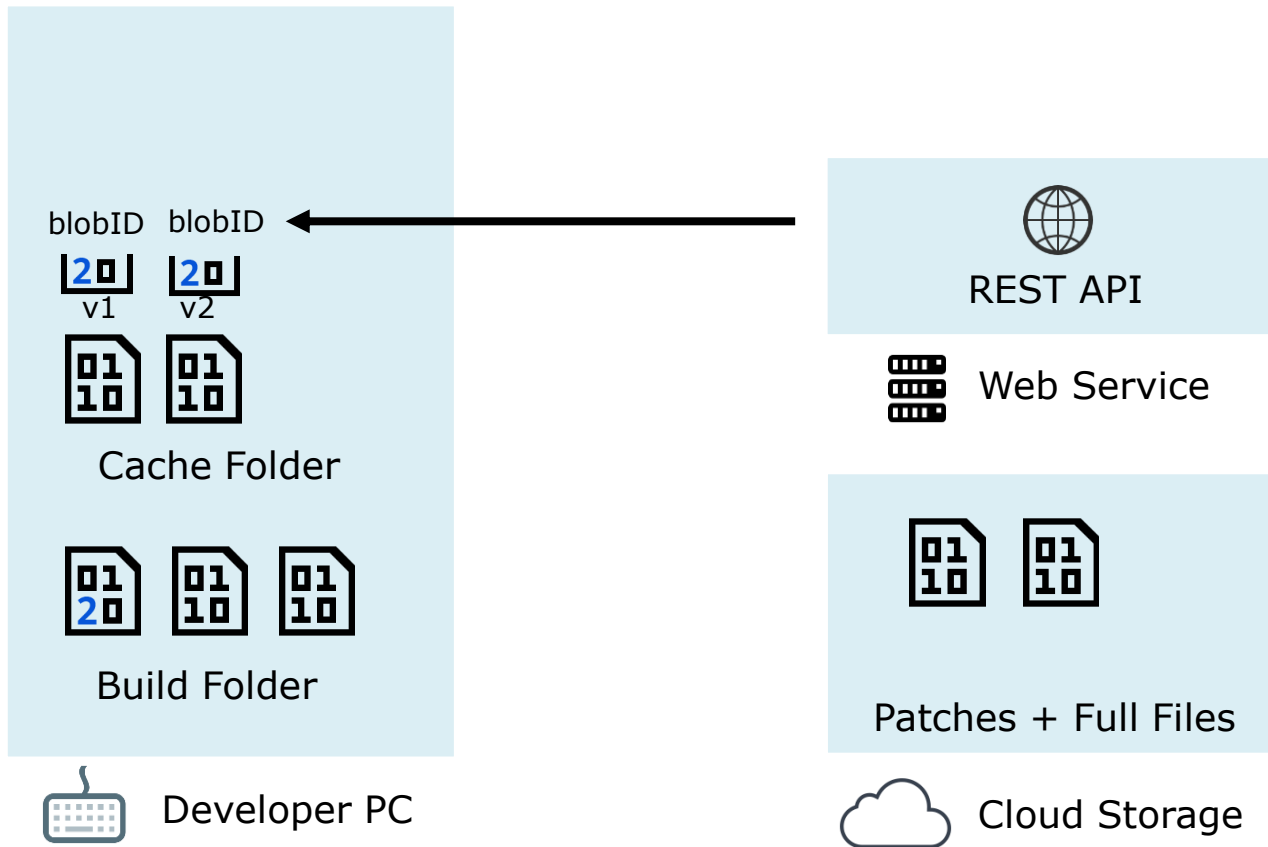


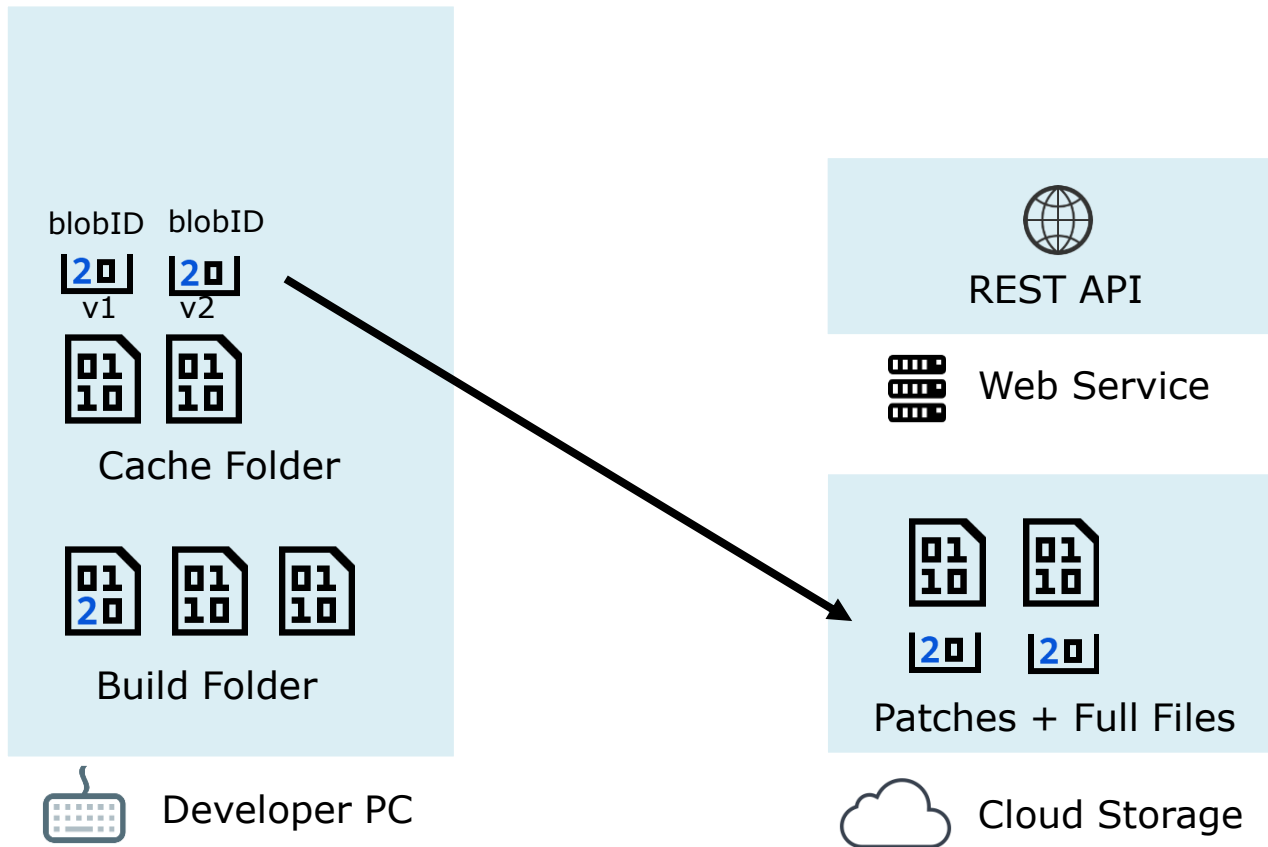
Web Service

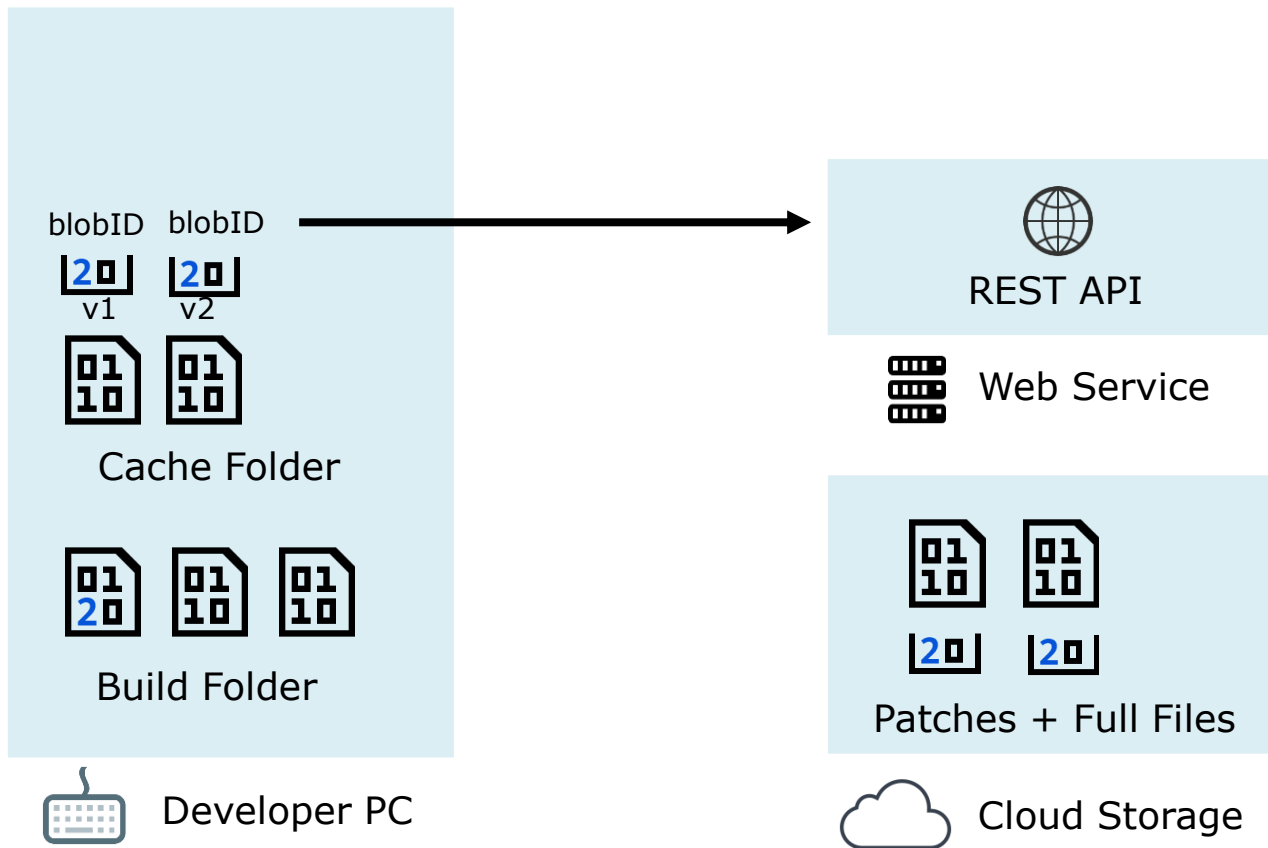


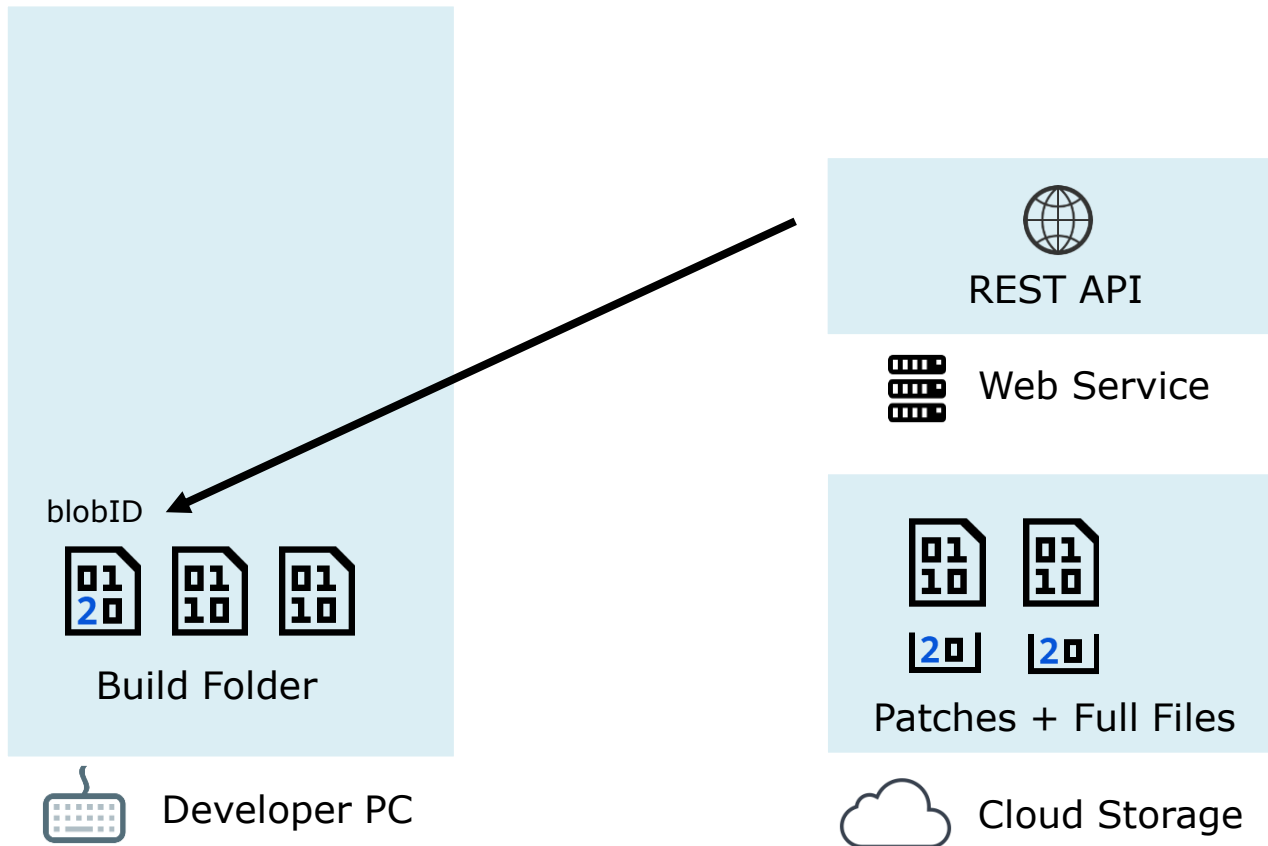
Cloud Storage

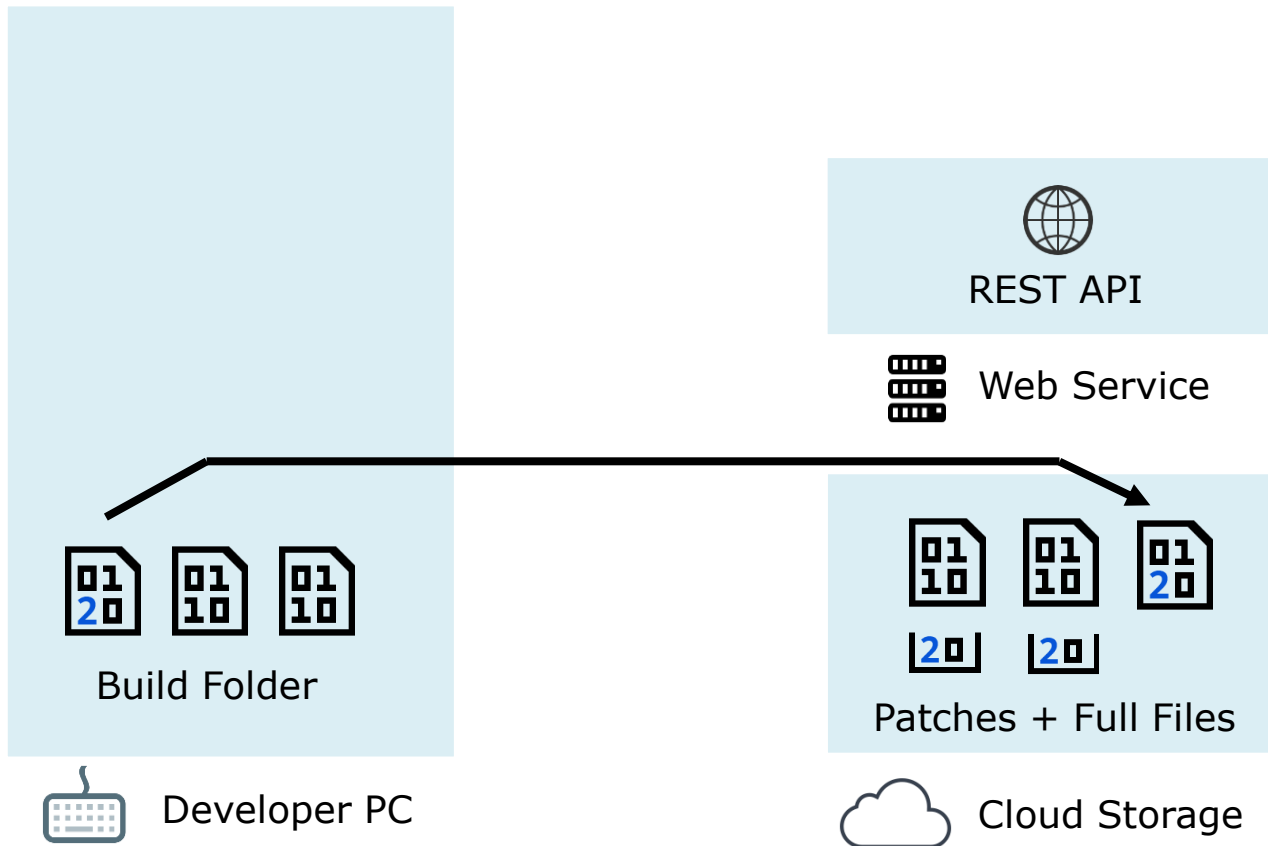


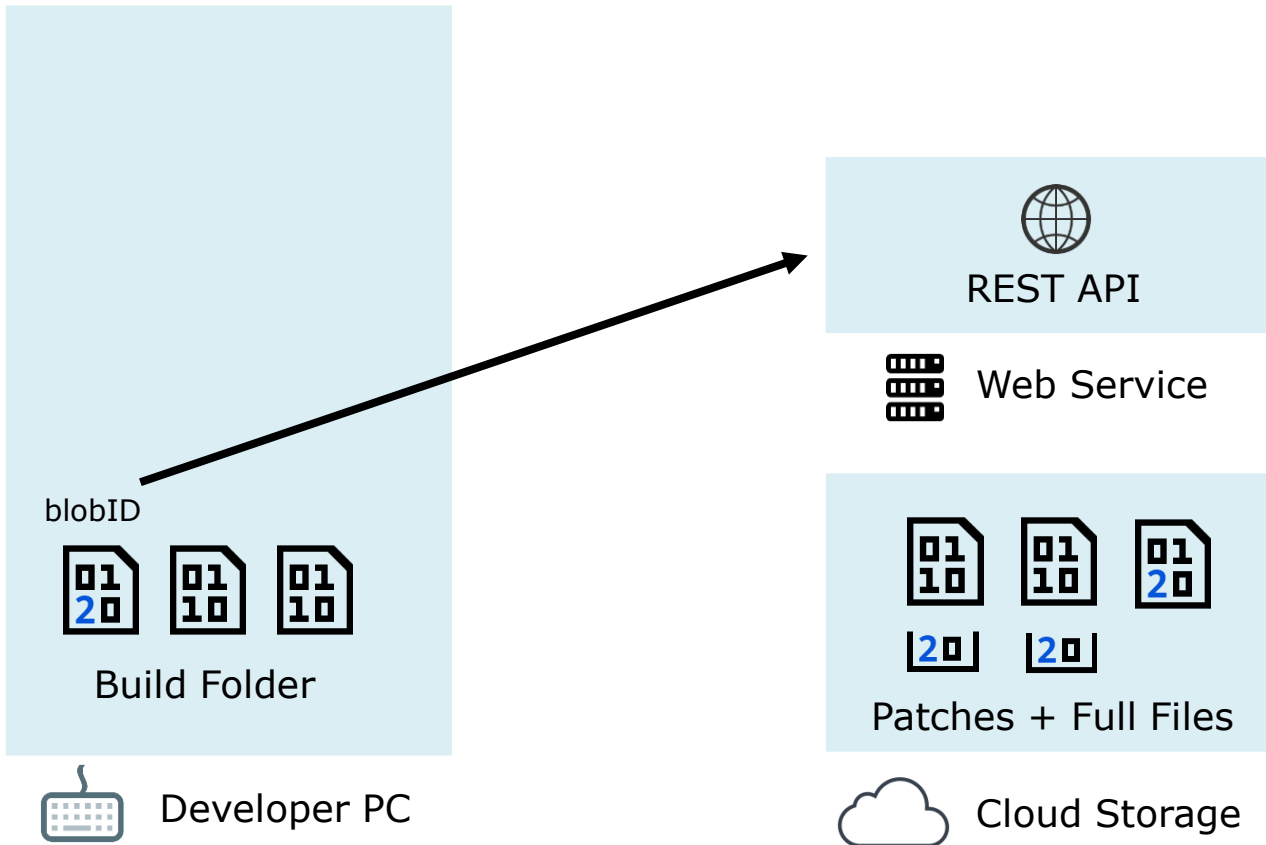


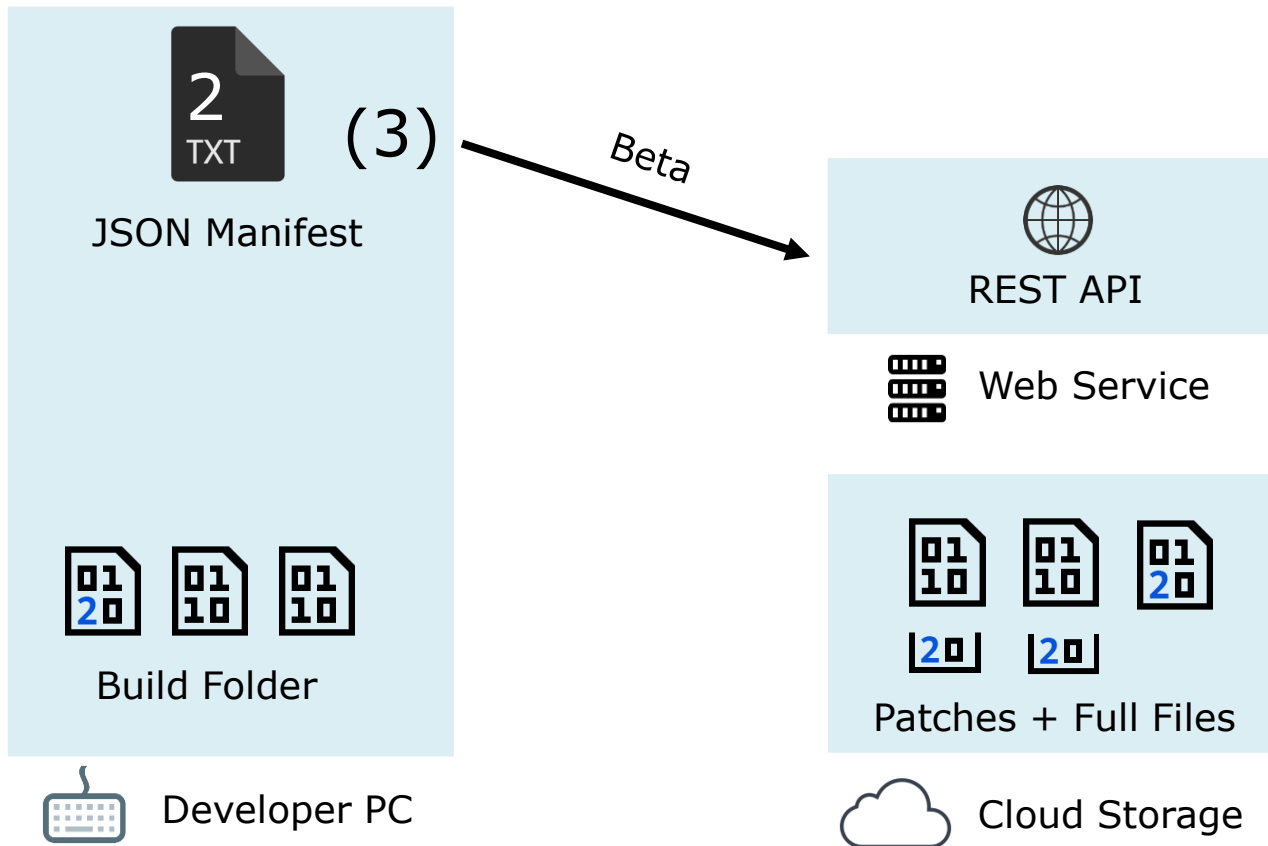


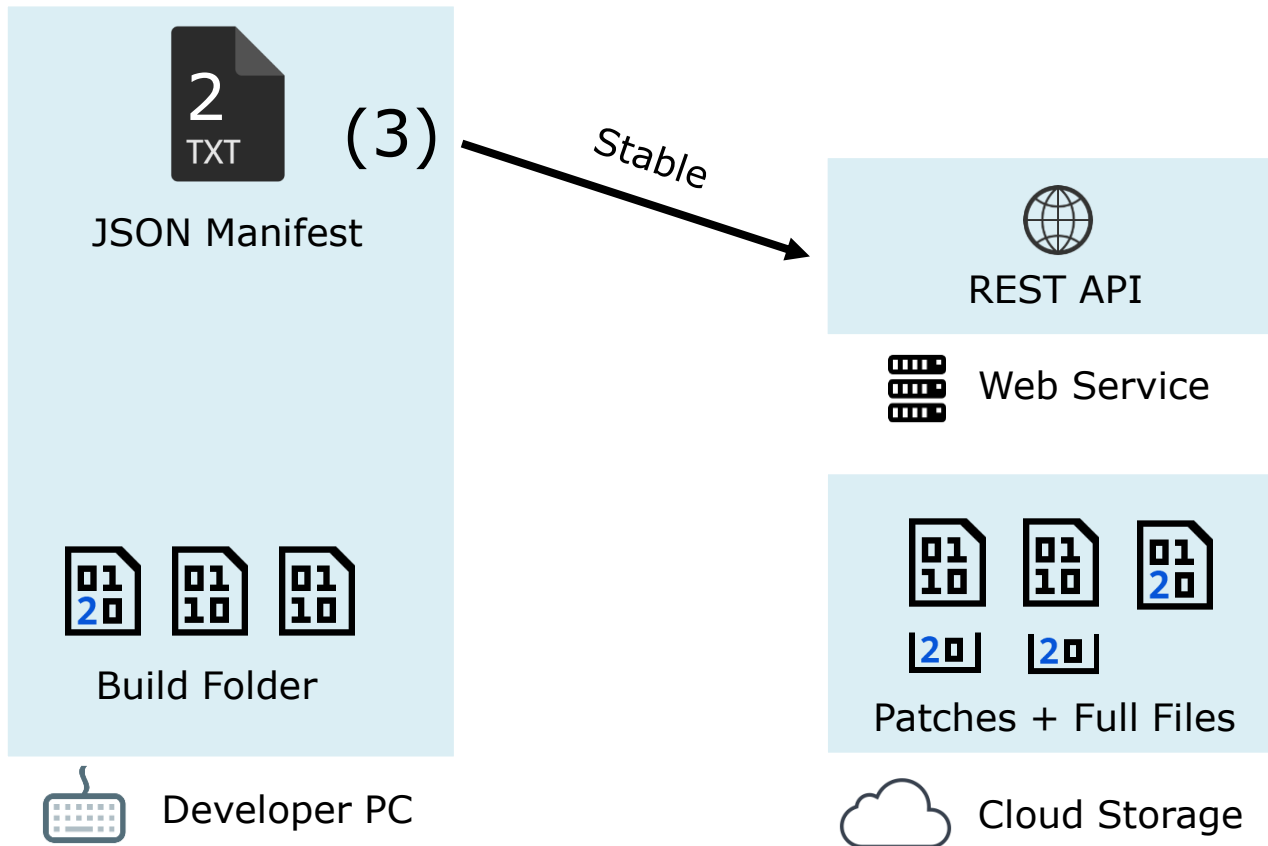












Database

- Distributions
 - Latest build #, beta build #, stable build #
- Files
 - Distribution ID, path
- Revisions / Blobs
 - File ID, from build #, to build #, CRC, etc...

Manifest Generation

- For each file in distribution
 - ```
SELECT * FROM revisions
WHERE
 fileID = :fileID AND
 toBuild <= :maxBuild AND
 fromBuild = :fromBuild AND
 uploadOK = true
ORDER BY toBuild DESC
LIMIT 1
```
- Cache!



# Error Handling – Temporary Fails

- Connection lost
- Corruption
- S3 goes AWOL
- Check CRCs + automatic retries



# Error Handling – Permanent Fails

- Firewall
- Antivirus
- Malware
- HDD failure
- Useful error messages & logging





# Family Safety Filter "JSON"

```
<html>
<head>
 <script language="javascript" type="text/javascript">
 function ProcessData() {
 var noframe = true;
 if(window.parent && window.parent.frames) {
 noframe = window.parent.frames.length < 1;
 }
 if(noframe) {
 window.location.replace('http://fss.live.com/...toApprove=false');
 }
 else {
 window.location.replace('http://fss.live.com/...toApprove=false');
 }
 }
 </script>
</head>
<body onload="ProcessData();">
</body>
</html>
```



# Proxies

- Rare, but still present



# Multiple Diff Methods

		Unity add asset - level0	Unity add asset - maindata	Unity add asset - sharedassets1.assets
Info	Original File Size KB	184,074.90	160,132.00	838,653.38
	Modified File Size	184,083.49	160,132.00	846,231.05
	Change in file size between orig & modified	8.59	0.00	7,577.66
Update Methods	Patch: bsdiff	2,486.17	0.17	N/A (too big)
	Patch: xdelta3	43,053.33	0.25	3,589.51
	Modified File   lzma compress	56,319.26	32.08	291,543.23
	Patch: bsdiff   lzma compress	2,511.66	0.17	N/A (too big)
	Patch: xdelta3   lzma compress	32,654.57	0.18	3,011.75

# Fallback

- Full download option if diff method fails



# Graceful recovery

- Power outage mid-update
- Corrupted install
- Partially installed
- Etc.



# Future changes

- Security / auth
- P2P



# Off-the-shelf solutions

- InstallShield
- RTPatch
- Unity Asset Store
- RakNet's patcher
- AESU?



# Thank you!

@8BitMMO

RobbyZ@ArchiveEntertainment.com





# Attribution

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- TXT icon [https://www.iconfinder.com/icons/199323/extension\\_file\\_format\\_txt\\_icon#size=256](https://www.iconfinder.com/icons/199323/extension_file_format_txt_icon#size=256)
- Binary icon from [https://www.iconfinder.com/icons/298769/binary\\_file\\_icon#size=128](https://www.iconfinder.com/icons/298769/binary_file_icon#size=128)
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