Milk flows freely from London to Cardiff with AFM

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Milk VFX

So...Who are we?

Milk is an independent visual effects company with studios in London and Cardiff

We've won numerous awards…

(including an Oscar for feature film Ex-Machina and 3 BAFTA Television Craft Awards)

All within 3 years!

The Problem - Expansion

- Artists
  - We needed space for at least another 50 artists
    - Space is a premium in Soho
    - Power and cooling in Soho = not so good
- Render Nodes
  - We needed to increase our farm by another 5000+ cores
    - Space is a premium in Soho
    - Power and cooling in Soho = not so good

The Problem - Expansion

- Needed to address offsite backup/DR
  - For business continuity and to comply with studio security compliance, we needed a backup/DR policy that ensured our work and data is intact if a bomb hit our main studio in London…And yes, they did use that phrase!!

The Answer

- A second office in Cardiff
  - We wanted it to be self contained but work directly with the same data as in London
  - We have people travelling back and forth so need the same environment to work in without having to change the way they work between offices
  - We have a collaborative workflow, so multiple people can be working on the same shot/sequence at the same time and this needed to work across multiple sites

The Answer

- AFM
  - We setup Cardiff to be an independent-writer cache of London
  - We expose only the Filesets we require in Cardiff
  - The artists work directly from the cache

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The Next Problem – fluid expansion

- We needed a way to be able to expand and contract our compute capabilities as work dictates without the cost of the overheads and CAPEX for short bursts

The Answer

- We looked to the Cloud
  - We set up a cloud AFM cache node
- Render nodes work directly from the Cloud cache
- We can scale to the capacity as required
- We setup AFM to be an independent-writer cache of London
- We expose only the Filesets we require on the Cloud
- Render Nodes
  - For renders with large datasets, we utilise the pre-caching facility to make sure we dictate when the copy happens

Some Stats

- Spectrum Scale v4.1 on both clusters
- London has 206TB~ usable
- Cardiff has 319TB~ usable
- latency London to Cardiff is 4.5ms
- latency London to the Google Cloud is 6.1ms

Some Stats

3 storage pools
- 1 nearline
- 1 realtime for playback
- 1 online for artists work

London
- 2 NSD heads
- 1 render node gateway
- 1 AFM gateway
- 2 playback clients

Cardiff
- 1 NSD head
- 1 render node gateway
- 1 AFM gateway

Some Stats

- 1GB point to point between London and Cardiff
- 1GB burstable to the cloud
- On a heavy day we can generate 10TB+ a day, especially with the FX simulation guys get going!


milk

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```
  0    0 101|   0     0 |  39k   12k|   0    22k|   0     0 :1091k   97M:   0     0 :  266B  178B: 371k   21M: 192k   14k: 272k   14k: 280k   73k:  54k   45k:9552B 373k: 804k   26k:  98k   29M:  57k 5309k:3229k  152M
  0  1.0  80|   0     0 |  37k   12k|4096B 4284k|   0     0 :1308k   94M: 270B  178B:   0     0 : 457k   24M:  72k   38k: 248k 1427k:9986B 8726B: 155k 9260B:1836k   16k:  15k   24k:1348k  227k: 802k   40k:6251k  120M
5.0    0 125|   0     0 |  55k   17k|   0   4132k|   0     0 :1034k   56M:   0     0 :   0     0 :1139k   64M: 389k   16k:5133k   46k:  10k  521k: 235k  816k:  92k  795k: 133k   35k: 204k  224k:1932k   24k:  10M  122M
2.0    0  75|   0     0 |  49k   26k|   0   8246k| 838k 3802B:3145k   67M:   0     0 :1340B 1068B: 900k   50M:  10k   10k: 254k 1623k: 660B   10k: 238k  197k:6758B 206k:4465k   14k:2218k   38k: 212k 8034B:  12M  119M
1.0    0 109|   0     0 |  44k   28k|   0    42M|   0     0 :1033k  102M:   0     0 :   0     0 : 321k   18M: 264k   49k:7244B  421k: 329k  102k: 218k   94k: 704k  201k: 107k   87k: 434k 4036k: 481k   21M:3896k  145M
1.0    0  92|   0     0 |  55k   21k|   0   1531k| 500B  356B:1727k   53M:   0     0 :   0     0 :1225k   68M: 344k   40k: 658k   36k: 110k 1630B:3058B   93k:  30k   90k: 658k  348k:  11k  403k:  75k  394k:4842k  122M
  0    0 112|   0     0 |  39k   15k|   0   4274k| 270B  178B:1059k   92M:   0     0 :   0     0 : 519k   27M:  26k   21k: 206k  311k:1958B 1278B: 266k 2492B:2670k   80k:9136B 645k: 266k   89k:  37k 1787k:5059k  122M
1.0    0  85|   0     0 |  44k   24k|   0     34k| 476B  348B:1049k   74M:   0     0 :   0     0 : 857k   45M: 457k   34k:1209k   35k: 392B  284B: 262k 4978B:  22k  221k: 227k 9702B: 912k  110k:6742B   25k:5002k  119M
  0    0  98|   0     0 |  32k 9335 |   0    18k| 290B  194B:1036k  108M:   0     0 : 475k 4402B: 200k 9757k:9110B  293k: 258k 8873k:2094B 1362B:  13k  201k:  20k  288k: 243k  327k: 277k   24k:3831B 6181B:2536k  127M
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  0  1.0 356|   0     0 |  36k   22k|   0     94M|   0     0 :3531k  115M: 230B  178B: 632k   26k: 170k 7258k: 119k 8900B: 272k  949k: 264k  341k:3104B 2044B:  68k   84k: 264k  237k:1824k   68k:3016k   40k:  10M  124M
  0    0 118|   0     0 |  32k 6694 |   0    12M|   0     0 :1067k  117M:   0     0 :   0     0 :  72k 3125k:  36k   29k: 200k  197k:6588B   21k:  14k  677k:3465k   81k:  15k  949k: 133k   12k:  24M   83k:  29M  122M
  0    0  81|   0     0 |  45k   13k|   0   4530k| 342B    0 :1011k   84M: 342B    0 : 342B    0 : 756k   39M: 453k   27k: 441k  225k:  13k   55k: 123k 3539k:  57k  356k: 239k 8270B: 192k 2582B:  11M   54k:  15M  127M
  0    0 102|   0     0 |  50k   26k|   0   4112k|   0     0 :1093k   66M:   0     0 :  14k 5780B:1072k   57M:6962B  13k: 299k 1607k:  11k   13k:1808B 1192B:  44k  117k: 336k 4618B: 112k  480k:7379k   50k:  10M  125M
  0  1.0  81|   0     0 |  54k   25k|  36M   12M|   0     0 :  946k   54M:   0     0 :   0     0 : 961k   63M: 190k   28k:  88k   23M:4237k   15k: 186k   73k: 254k  109k:8004B 566k: 418k 1143k: 487k   52M:7774k  194M
 10    0 123|   0     0 |  33k   28k| 280k 8353k|   0     0 :2645k   38M:  71k  626B:   0     0 :1411k   57M: 225k   12k: 195k  314k:  94k 1913k:5018B 4028B:  20k  126k:  48k 8728B:  15k 1529k: 561k   35M:5288k  134M
1.0    0  62|   0     0 |  43k   46k|   0     38M|  25k   21k: 608k   30M:   0     0 : 602k 2386B:1031k   65M:  48k 8738B:2060k   16k:  12k   51k: 859k   29k:1681k  182k:  13k   22k: 265k  746k: 919k   86k:8123k   96M
  0  1.0 122|   0     0 |  37k   13k|   0    8359k|  60B    0 :1061k  113M:   0     0 :  19k 1448B: 120k 6339k: 518k   34k:1735k   34k:1622B   22k: 217k 9528B:2735k  201k: 104k  156k:5491k  548k:1042k   44k:  13M  120M
  0    0  84|   0     0 |  33k   11k|   0    3114k| 270B  178B:1097k  112M:   0     0 :   0     0 : 201k 7320k:  57k   17k: 163k  606k:1654B 1050B:3370B   68k:  112k  525k: 290k  382k: 248k 1408k:1795k   25k:3968k  122M
1.0  2.0 103|   0     0 |  35k   13k|   0    5439k|   0     0 :1023k  109M:   0     0 :   0     0 : 202k   12M: 183k   75k:  12k   56k:1534k 7528B: 227k 6700B:1344k  453k:  10k  895k:1269k 8298B:2550k   13M:8353k  135M
  0  1.0  77|   0     0 |  42k   22k|   0     32M|   0     0 :1312k   42M:   0     0 :   0     0 : 948k   62M: 293k 2364B: 190k  656k: 211k 1674B:7262B  556k:  11k  218k: 293k 1368k:  26M  294k:  11M 1133k:  40M  109M
  0    0 120|   0     0 |  36k   18k|  64k 6535k| 105k   80k: 979k   97M:   0     0 : 532B  410B: 422k   21M:4522B 3538B: 134k  529k:1574B 9500B:  38k 1230k:1547k  147k:  16k 2066k: 169k 3358B:7760k   37k:  11M  123M
1.0    0  61|   0     0 |  30k   18k|  97k  113M|1630B 1242B:1056k  117M:   0     0 :  17k 2322B:  15k 1397k: 767k 8638B: 209k 8026B:1898B 1278B: 118k  315k:3354k   99k:  229k   36k: 177k   23k: 152k   32k:6096k  119M
  0  1.0 121|   0     0 |  31k 6834 |  32k 8250k|   0     0 :1083k  115M: 270B  232B:  78k 2180B:  76k 4144k:2962B 6206B: 253k 2262B:8766B 6934B:1868B 1510B:9356B  216k:  390k   23k:4457k   18k:8957k   38k:  15M  119M
1.0  1.0  91|   0     0 |  32k 9525 |5240k 4153k|   0     0 :1132k  118M:  16k 2222B:   0     0 :  21k  629k: 196k 3070B:8704B  360k: 328k 3492B: 137k 4144B: 412k  519k:1073k   25k:  685k 4262B:  10M   15M:  14M  134M
1.0    0 177|   0     0 |  31k 9019 |   0     16k| 218B    0 :2413k  117M:   0     0 :   0     0 :  46k 4358k: 138k 2278B: 188k  256k: 101k 1488B:2218B  250k:  50k 3611k:7422B  139k:4726B   57k:  66k 3329k:3015k  128M
3.0    0 546|   0     0 |  35k   10k|   0     20M|  54k   40k:1043k  117M:   0     0 :  24k  633k:  60k 1833k:7126B 5470B:1127k   40k:7246B 7084B:  19k  393k:  263k  578k:2598B 1702B:  183k   12k:  25M   86k:  28M  121M
  0    0 282|   0     0 |  36k 7971 |   0     46M|  20k   39k:1059k  117M: 270B  178B:  61k 3022k:  17k  481k: 159k 2502B: 359k  461k:1638B   34k: 256k 7213k:1433k 2813k: 283k 2308B: 133k  221k:  37M  129k:  40M  131M
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  0    0  82|   0     0 |  31k 7874 |8192B 7596k|   0     0 :1092k  117M: 786B  686B:   0     0 :  20k 1861k: 207k 9594B:7576B 5332B:1417k 1465k: 307k 7911k: 149k  122k:2962B   14k: 242k 8094B: 119k   12M:3564k  140M
1.0    0 144|   0     0 |  33k 7644 |   0     16M|   0     0 :1085k  117M:  20k 1882B:   0     0 :  71k 3225k:3188k   16k: 112k  513k: 178k 2082B:  46k   19M:1196k   92k:9774B  351k:  950k  125k:  17M   66k:  24M  141M
  0  1.0  70|   0     0 |  46k   32k|   0     63M|   0     0 :  825k   56M:   0     0 :  83k   11k: 909k   54M:3542B 2742B:  57M  147k:3164B 5832B:1347k 6088B: 718k  238k:  40k  113k: 432k  907k:  10M   69k:  71M  111M
  0  1.0 121|   0     0 |  24k   22k|  96k   33M|   0     0 :  573k 3614B:   0     0 :  43k   37k: 691k   65M:  35k 6826B:  15M  160k:6106B 4526B: 262k   79k: 374k   93k: 298k  555k:  16k  770k:  17M  129k:  35M   67M
2.0  1.0  72|   0     0 |  22k   26k|  97k   20M| 342B    0 :8460B 3182B:  16k 2144B:  32k   47k: 666k   62M:  52k   31k:3350k  546k:2574B 1504B: 127k   36k:  21k   75k: 198k 7056B:8405k 4424k:1724k   73k:  14M   67M
---procs--- ---paging-- ---system-- -dsk/total- --net/gig0---net/gig1---net/gig2---net/gig3---net/gig4---net/gig5---net/gig6---net/gig7---net/gig8---net/gig9---net/gig10---net/gig11----net/man0---net/total-
run blk new|  in   out |  int   csw |  read  writ|  recv  send:  recv  send:  recv  send:  recv  send:  recv  send:  recv  send:  recv  send:  recv  send:  recv  send:  recv  send:  recv  send:  recv  send:  recv  send
1.0  2.0 113|   0     0 |  43k   51k|  64k  123M|5564B   12k: 235k   11M:  60B   42B:8240B   11k:1263k   96M: 237k   20k:2754B   27k: 540k 3202B: 206k  486k:1419k   87k:7767k  107k: 523k 1724k:  32M 9544k:  44M  119M
  0  2.0  82|   0     0 |  24k   19k| 160k   41M|4390B   19k: 157k   15M:   0     0 :  15k   20k: 390k   34M: 149k   62k:1132k   19k: 109k 2056B:  12M   32k:4666B  139k:  41k 3621k:  22k   77k:  31M 6906k:  45M   60M
  0    0 103|   0     0 |  22k   20k|  33k   19M|  13k   23k:  26k 2802k:   0     0 :  26k   22k: 386k   38M:  43k   25k: 258k 4873k:6812B 5416B:  10k  107k:6421k  319k:  14k  351k:1197k  422k:  14M   10M:  22M   56M
4.0    0  81|   0     0 |  28k   17k|1316k   64M|   0     0 : 197k   13M:   0     0 :  28k   24k: 551k   44M: 397k   57k:3847k   80k:1864B 1220B:5452B   73k:1064k   28M:  277k 1245k:4864B 3444B:  22M  133k:  28M   86M
1.0    0 113|   0     0 |  21k   23k|  32k   88M|   0     0 :  66k 4252k:   0     0 :  14k   13k: 366k   34M:1030k   69k:  812k   48k:4670B 3490B:5738B   66k:  26k  676k:  188k  688k:3293k  573k:  47M  171k:  52M   40M
1.0    0  68|   0     0 |  16k   18k|8306k  163k|   0     0 :  37k 2220k: 270B  178B:  31k   531k: 316k   28M:  147k   12k:  13k   76k: 266k 4628B: 238k 4566B: 435k 3317k:  11k  207k: 575k  314k:  494k   14M:2562k   49M
  0  1.0 120|   0     0 |  19k   18k|   0     63M| 166k  163k: 276k   19M:   0     0 :  156k 8697k: 131k 8837k:2430k   65k:  267k   24k: 187k  139k:6950B   58k:  13k  798k:7616B   18k:3214B 6262B:  17M   93k:  21M   38M
3.0  1.0 265|   0     0 |  17k   17k|  12M 8304k|   0     0 :  22k   573k:   0     0 :  60B     0 : 404k   37M:  58k   60k:  141k   70k:2306B  155k:  226B  142B:  333k  341k:  714B  454B:  364k 3850B:  12M   47k:  14M   38M
  0  1.0 210|   0     0 |  15k   18k|  840k   24M|  840k 4978B:9748B  869k:  342B    0 :  342B    0 :  326k   22M:  76k 2699k:  665k   14k:3344B 1166B:4846B 3124B:  190k 2129k:  299k   44k:9020B 8636B:  16M   70k:  18M   28M
1.0    0  90|   0     0 |9041  8008 |   0    8365k|   0     0 :  16k 1496B: 270B  178B:1316B 1068B:  60k 4165k:  29k   26k:  178k 4641k:  52k   43k:  32k  422k:  14k 1794k:2666k   47k:  247k   28k:  131k   47k:3426k   11M
  0  1.0  93|   0     0 |  14k   19k|  24M 8497k| 270B  232B:  16k 1496B: 270B  178B:  20k 1936B: 156k   13M: 300k  350k:  23k   29k:1177k  230k:1265k  455k:  213k  316k:6408B 2832B:  414k   15k:  385k   40M:3976k   54M
6.0    0 113|   0     0 |  26k   22k|   0    9502k|   0     0 :  581k 3170B:1246B  898B: 289k   11k: 762k   77M: 184k   78k: 186k   24k: 205k   51k:9916B   61k:  68k 4525k:  87k  405k:2853k 1440k:  44k 4366k:5269k   88M
  0    0  91|   0     0 |  17k   23k|   0     68M|   0     0 :3465k   15k:   0     0 :  17k 2148B: 402k   34M:  49k   49k:  172k   20k:  42k   34k:  54k  687k:1073k  255k:  25k   24k:  241k   21k:  29k   43k:5569k   35M
2.0    0 106|   0     0 |6562  4649 |   0     23k|  61k   56k: 385k 5028B:   0     0 :  17k 5666B: 24k   791k: 457k 7660B:1422k 3461k:  13k   10k:2122B 1490B:  307k 3924B:  181k  379k:  12k  244k:  130k   23k:3011k 4987k
```

milk-cdf-sn-001 : root | milk-cdf-sn-001 : root | ...lk-cdf-sn-001 : root

Every 0.5s: mmafmctl mmfs1 getstate Fri M

Fileset Name	Fileset Target	Cache State	Gateway Node	Queue Length	Queue numExec
nas-general	nfs://milk-ldn-tn-001/mmfs1/GENERAL	Active	milk-cdf-sn-001	0	337
nas-apps	nfs://milk-ldn-tn-001/mmfs1/APPS	Active	milk-cdf-sn-001	0	2922188
nas-repo	nfs://milk-ldn-tn-001/mmfs1/REPO	Dirty	milk-cdf-sn-001	28	598384
nas-tools	nfs://milk-ldn-tn-001/mmfs1/TOOLS	Active	milk-cdf-sn-001	0	212
nas-vm	nfs://milk-ldn-tn-001/mmfs1/VM	Active	milk-cdf-sn-001	0	29
nas-dist	nfs://milk-ldn-tn-001/mmfs1/DIST	Active	milk-cdf-sn-001	0	425
nas-library	nfs://milk-ldn-tn-001/mmfs1/LIBRARY	Active	milk-cdf-sn-001	0	2997
nas-code	nfs://milk-ldn-tn-001/mmfs1/CODE	Dirty	milk-cdf-sn-001	40	9862580
nas-library-old	nfs://milk-ldn-tn-001/mmfs1/LIBRARY	Inactive			
nas-users	nfs://milk-ldn-tn-001/mmfs1/USERS	Dirty	milk-cdf-sn-001	50	2560466
nas-jobs	nfs://milk-ldn-tn-001/mmfs1/JOBS	Dirty	milk-cdf-sn-001	80	585203
nas-production	nfs://milk-ldn-tn-001/mmfs1/PRODUCTION	Active	milk-cdf-sn-001	0	30