

ThoughtWorks®

TECHNOLOGY RADAR

Our thoughts on the
technology and trends that
are shaping the future

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WHAT'S NEW?

ABOUT THE TECHNOLOGY RADAR

H\ci [\k cf_YfgUFY'dUgg]cbUH'UVci hHYWbc`c[m'k Y'Vi]X'jzFYgYUFW'jzHYgh]zcdYb'gci fW'jzk f]HY'UVci h]zUbx' VzbghUbm]a'hc'ja dfcjY'h'zcf'Yj YfncbY'"Ci f'a]gg]cb]g'hc'VUa d]cb'gcZk UFY'YI W''YbW'UbX'fYj c'i h]cb]nY' H"K Y' WYUH'UbX'g\UFY'h'Y H\ci [\k cf_gHYWbc`c[mFUxUf]b'gi ddcfhcZ'h'Uha]gg]cb"H\Y'H\ci [\k cf_gHYWbc`c[m 5Xj]gcfm6cUfXZU[fci d'cZgYb]cf'HYWbc`c[m'YUXYfg]b'H\ci [\k cf_gzVWYUH'g'h'Y fUXUf"H\Yma Y'h'fY[i 'Uf'mrc' X]gW'gg'h'Y['cVU'HYWbc`c[m]gfUH'Y[mzcf'H\ci [\k cf_g'UbX'h'Y'HYWbc`c[m]fYbXg'h'Uhg][b] Wbhm]a dUW'ci f']bXi g'f'mt

H\Y fUXUf'Wdhi fYg'h'Y'ci hdi hcZ'h'Y'HYWbc`c[m5Xj]gcfm6cUfX'g'X]gW'gg]cb]b'U'Zcfa U'h'Uhd'fcj]XYgj U'i Y'hc'U' k]XY'fUb[Y'cZgh_U\c'XYfgz'Z'ca '7 Cg'hc'XYj Y'cdYfg"H\Y'Vzbh'bh]g]b'h'YbXYX'Ug'U'Vzb'Vj]g'gi a a Uf'm'k Y'YbV'ei fU[Y'nci'hc'YI d'cfY'h'Yg'HYWbc`c[]Yg'Zc'f'a cfY'XYHJ]"H\Y fUXUf]g[fUd\]W']b'U'hi fYz[fci d]b[]h'Y'a g]b'hc'HYW'b]ei Yg'z'hc'g'zd'Uh'Zc'fa g'z'UbX''Ub[i U[Yg/ 'Z'Ua Yk cf_g"K \Yb fUXUf]h'Y'a g'V'ei 'X'UddYUf]b'a i 'h]d'Y'ei UxfUb'rg'zk Y'W'cgY'h'Y'cbY'h'UhgY'a YX'a cgh'Udd'f'cdf]UH'"K Y'Z' f'h'Yf[fci d'h'YgY']h'Y'a g]b'Zci f'f]b[g'hc'fY YV'ci f'W'ffYbhd'cg]h]cb'cb' them. The rings are:

We feel strongly that the industry should be adopting these items. We use them when appropriate on our projects.

Worth pursuing. It is important to understand how to build up this capability. Enterprises should try this technology on a project that can handle the risk.

Worth exploring with the goal of understanding how it will affect your enterprise.

Proceed with caution.

H'Y'a g'h'U'fY'b'Yk'cf'\Uj Y\UX'g][b] Wb'h'W'Ub[Y'g]b'W'h'Y''Ugh'fUXUf'UFY'fYdfYgYb'h'X'Ug'h'f]Ub['Yg'z'k '\]Y']h'Y'a g'h'U' h'Uj Y'b'c'h'a c] YX'UFY'fYdfYgYb'h'X'Ug'W'f'W'g'"K Y'UFY']b'h'Y'fYg'h'X']b'Z'U'f'a cfY']h'Y'a g'h'U' b'k Y'W'b'fYU'g'c'b'U'V'm' h']b'hc'U' Xc'W'a Y'b'h'h']g'g]n'Y'z'gc'k Y'Z'J'X'Y'a U'bm]h'Y'a g'Z'ca 'h'Y''Ugh'fUXUf'hc'a U_Y'f'cca' Zc'f'h'Y'b'Yk']h'Y'a g'": UX]b['Ub']h'Y'a 'Xc'Y'g' not mean that we no longer care about it.

: cf'a cfY VUW[fci bX'cb'h'Y'fUXUf'z'g'Y' h\ci [\k cf_g'V'z'a #fUXUf#ZUe



THE RADAR

TOOLS

ADOPT

- 48. 7ca dcgYf
- 49. ; c 78
- 50. A ci bHVUub_
- 51. Dcgra Ub

TRIAL

- 52. 6cch&XcW_Yf
- 53. 6f][\HYf
- 54. 7cbgi `
- 55. 7i fgij Y
- 56. ;]h@UV
- 57. Hamms
- 58. bXYI YX86
- 59. Dc`m
- 60. F9GHUggi FYX
- 61. Gk U[[Yf
- 62. Xamarin
- 63. N5D

ASSESS

- 64. 5dUWY ?UZ_U
- 65. 6`UWVcl
- 66. 6c_Y\#Y[U
- 67. Gor
- 68. BU7`
- 69. Origami
- 70. DUW_YHYUUh
- 71. dXZa U_Y
- 72. D`UbH A @
- 73. Dfca YH.Yi g
- 74. E i]W
- 75. GYVf]mA cb_Ym

HOLD

- 76. 7]fj] Zcf XYj Y`cda Ybh

LANGUAGES & FRAMEWORKS

ADOPT

- 77. BUbWn

TRIAL

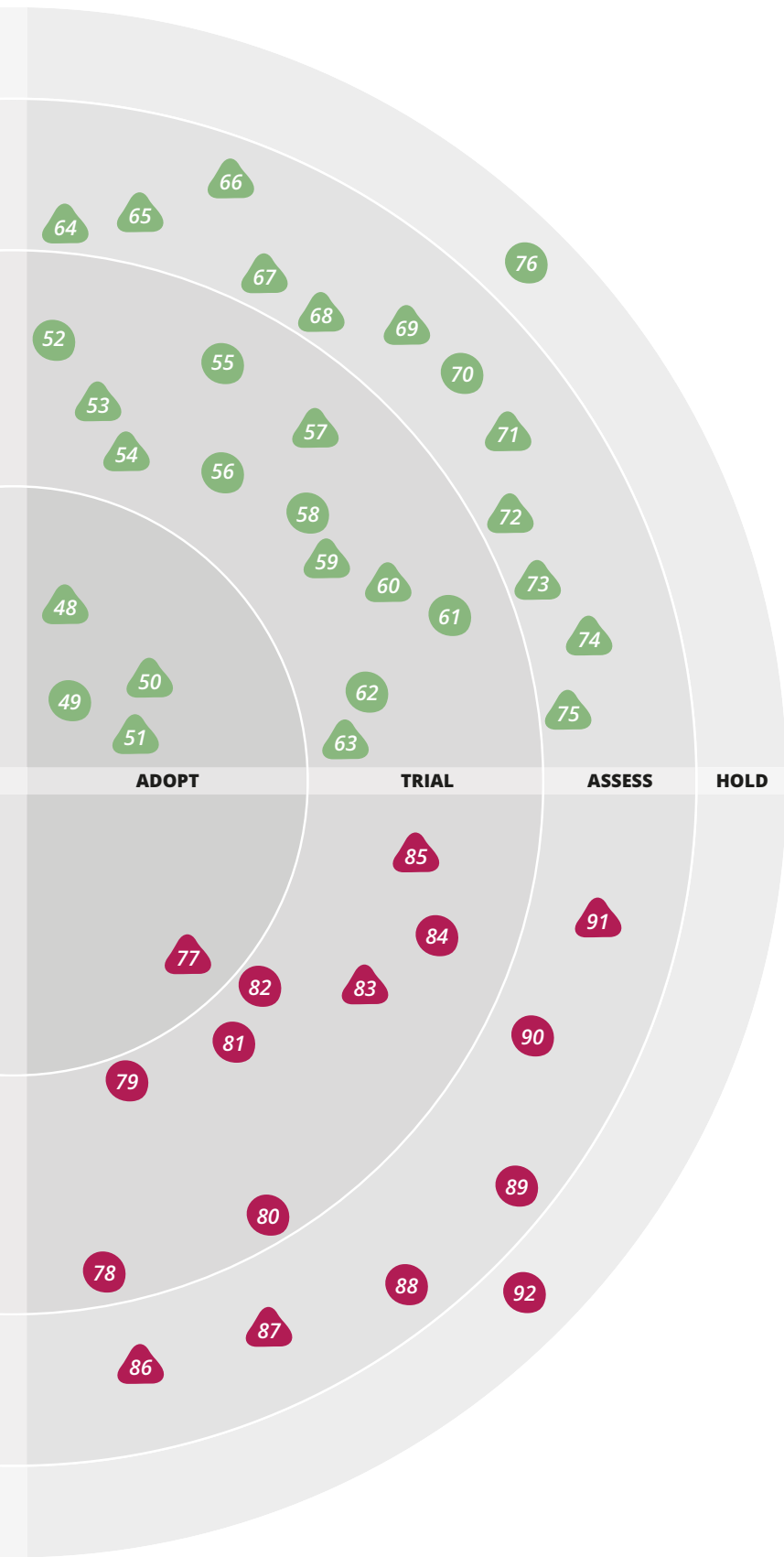
- 78. 8Ug\]b[
- 79. 8`Ub[c`F9GH
- 80. cb]W`fUa Yk cf_
- 81. BUg`cfb
- 82. Om
- 83. FYUW`g
- 84. FYHc`h
- 85. Gdf]b[`6cch

ASSESS

- 86. 9a VYf`g
- 87. :][\H`g
- 88. <Ug_Y`< UXccd`]VfUfm
- 89. @ch`g
- 90. FYU[Ybh
- 91. Gk]zh

HOLD

- 92. -G:



K \ Yb'k c]bXYdYbXYbhmXYj Y'cdYX'gYfj]WgUFY' Vē'UVcfUHQb[žVWUb[Yg'hc h'Y'gi dd'Yfg'5D Wb'Wli gY' ZU]i fYg'Zcf'U'']hg'Vēbgi a Yfg'7cbgi a]b['gYfj]Wg' i gi U'mWbbchhYghU[U]bgh'j] Y'gi dd'Yfg'g]bW'gi W' hYg'gUFY'g'ck 'UbX'Vf]hY'fā Ufh]bZck 'Yf'Vēa #Ufh]Wg# bcb8YH'fa]b]ga " \ ha ` , FYa chYGYfj]Wg'zgc]hg'VYgh'c' i gY' hYgh'8ci V'Yg'fā Ufh]bZck 'Yf'Vēa #V']#hYgh'8ci V'Y' htm]ē'YUX]b['hc' h'Y'XUb[Yf'h'Uh'h'Y' hYgh'Xci V'Yg'[Yh' ci hcZ'gmb'Wk]h' h'Y'fYU' 'gi dd'Yfg'gYfj]W''7cbgi a Yf' h'Ua g'Wb'dfch'Vh'h'Ya gY'j Yg'Zca h'Yg'Y ZU]i fYg'Vm i g]b[]bhY[fU]h]cb Vēb'bfUW'hYg'g'fā Ufh]bZck 'Yf'Vēa #V']# bhY[fU]h]cb'7cb'bfUW'hYg'h' \ ha 'ē' h'g'g'h'Uh'Vēa dUFY'UW' U' gYfj]W' fYg'dcbgYg'k]h' h'g'h] U'i Yg'K \]Y'gi W' Vēb'bfUW' h'g'g'UFY'j U'i UV'Yž'h'Ym'UFY'Yj Yb'a cfY'i gY'Z' 'k \ Yb' consuming services provide these tests to the supplier, k \ c'Wb h'Yb'f'i b'U' h'Y'f'Vēbgi a Yfg'Vēb'bfUW'h'g'g'hc' XYH'fa]bY']Z'h'Y'f'W'Ub[Yg'UFY']_Y'm'c' Wli gY'd'fcV'Ya g' 'UXcd]b[Vēbgi a Yf'X'f]j Yb'Vēb'bfUW'g'f'martinfo'w'ler. Vēa #Ufh]Wg' #Vēbgi a Yf'8'f]j Yb'7cb'bfUW'g' \ ha 'ē' 'Gi W' **consumer-driven contract tests** are an essential part cZU'a U'i fY'a]W'cgYfj]W' hYgh]b[fā Ufh]bZck 'Yf'Vēa # Ufh]Wg#a]W'cgYfj]W'hYgh]b[#ē'd'cf'ē'c']c"



K \ Yb'k Y'bYX'UX]U[fUa 'h'Uh'XYg'W]VYg'h'Y'W'ffYbh]b'Z'Ug'f'i Vā fY'cf'd' \ ng]W' U'f'W']h'Vā fY'k'Y'i gi U'm]U_Y' hc'ci f'ZU]cf]h' h'Y'W'b]W' X]U[fUa a]b['tcc'"" Znci 'UFY' using the cloud or virtualization technologies this no 'cb[Yf'a U_Y'g'gYbgYžk Y'Wb'i gY' h'Y'd'fcj]XYX'5D'g'hc' interrogate the actual infrastructure and generate a live, **automated infrastructure diagram** using simple tools]_Y'; fUd\J]n'f'g'raphviz.orgē'cf'V'mci hdi H]b['G]; "

C]bY' f'g'hk YV'Udd']W'h]cbg'd'fcj]XY'h'Y'UV']]m'hc' XYg] b'k YV'Udd']W'h]cbg'Z'c'c]bY'UW'gg'V'm'Ya d'c'm]b[' caching and updating mechanisms. The implementation fYei]fYg'U' U[]b' h'Y'8CA 'hc' W'Y'W'k \ Y'h'Y'f'h'Y'UW'gg]b[XYj]W']g'c]bY'cf'cb']bY'z'UW'gg]b['c'W'g'c'f'U[Y'k \ Yb' c]bY'z'Ub'X'g'nb'V'f'cb]g]b['X'U'U'k \ Yb'cb']bY'5' h'Y'a U'cf' V'f'ck gY'f'g'b'ck'gi d'c'f'h'Ub'c']bY'a c'X'Y'z'k]h' h'Y'c'W']b'Z'ca U'h]cb'UW'gg]V'Y'V'm'gd'V'W'nb]b['U'a U'b]Z'g'h'U'h]f]Vi h'Y' in the html, which bootstraps the process of downloading UbX'W'W]b[h'Y'f'Y'g'ci f'W'g'gi W' U'g' <HA @7GG'z'Uj UG'W]d'h']a U[Y'g'Ub'X'c'h'Y'f']_b'X'g'c'Z'f'Y'g'ci f'W'g'h'Y'f'Y'UFY'g'ca Y' h'c'g'k \]W' \ Y'd'g]a d']z'nc']bY' f'g'h]a d'Ya Yb'U'h]cb'gi W' as **Hoodie f'hood.iē'z'Ub'X' **CouchDB** f'ē'ouchdb.apache.orgē'U'g'c'c' Y'f'g'UV']]m'hc' k'cf'_k]h' U'c'W' m'X'Y'd'c'm'Y' application on a local data storage.**

A c'g'h'g'c'Z'k U'f'Y'XYj Y'c'da YbhY' c'f'g'U'f'Y'X'cb'Y'i g]b['h'Y' mental model of a project, something that is planned, YI YW'h'X'z'Ub'X'XY'j] Y'f'Y'X'k]h']b'XY' b'YX'h]a Y'g'c'hg'5[]Y' development challenged much of this model, replacing Ub'i d']z'c'bh'XYH'fa]b'U'h]cb'c'Z'f'Yei]f'Ya Ybh'g'k]h' Ub'cb! [c]b['X]g'Vēj Y'f'm'd'f'c'W'gg'h'U'h'f'i b'g'Vēb'W'ffY'b'h'm'k]h' XYj Y'c'da Ybh' @U'b'g'h'U'f'i d'h'W'b]e]i Y'g'z'gi W' U'g'5#6' h'Ygh]b['c'Z'c'V'g'Y'f'j Y'X'f'Yei]f'Ya Ybh'g'fā Ufh]bZck 'Yf'Vēa # V']#C'V'g'Y'f'j Y'X'f'Yei]f'Ya Ybh' \ ha 'ē'z' f'h'Y'f'c'XY'h']g' a]b'X'g'Y'h'K Y'Vēb'g]X'Y'f'h'U'ha c'g'h'g'c'Z'k U'f'Y' c'f'g'g'c'c' X' Z'c'ck h'Y'Y'UX'c'Z'@Y'Ub'9'bh'f'd'f]g'Y'f]b'Z'c'h'ci [\ h'k'c'f'g' Vēa #Y'Ub'!Ybh'f'd'f]g'Y'!V'cc' \ ha 'ē'U'b'X'Vēb'g]X'Y'f'h'Ya g'Y'j Y'g' hc' VY'Vi]X]b['d'fc'Xi V'g'h'U'h]g' d'c'f'f'hi b'X'Y'f'nb]b['Vi g]b'Y'gg' d'fc'W'gg'Y'g'Gi W' d'fc'Xi V'g'X'c' b'ch' \ U'j'Y'U' b'U'XY'j] Y'f'n'z' f'U'h'Y'f'Ub'cb![c]b['d'fc'W'gg'c'Z'YI d'c'f]b[' \ c'k' VY'gh'c' support and optimize that business process which Vēb'h]bi Y'g'U'g'cb['U'g'h'Y'Vi g]b'Y'gg]g'k'c'f'h'k \]Y'": c'f'h'Y'g'Y' f'Y'U'g'c'bg'k Y'Yb'Vēi fU[Y'cf[Ub]n'U'h]cb'g'hc' h']b'_]b' h'Y'fa g'c'Z' d'fc'Xi V'g'f'U'h'Y'f'h'Ub'd'fc'Y'V'g'

5dUWY GdUf_ fgdUf_ "UdUWY"cf[k\ Ug\ VYYb`ghUX]mi
gaining ground as a fast and general engine for large-
gWY XUHUdfcWgg]b[""H\Y Yb[]bY]gk f]Hb]b`GW`U`UbX`
]gk Y`gi]hYX`Zcf`Udd`]W]h]cbg`h`UhfYi`gY`Uk`cf_]b[`gYh`
cZXUH`UW`cgg`a`i`h`d`Y`dUfU`Y`cdYfU]h]cbg`" hgXYg][bYX`
hc`k`cf_`Ug`U`gh`UbXU`cbY`W`ghYf`cf`Ug`dUfhcZ<UXccd`
M5FB`W`ghYf`" h`Wb`UW`gg`XUH`Z`ca`gci`fW`g`gi`W`Ug`
<8: Gz7UggUbXfUzG`YH`W`GdUf_`U`gc`c`Yfg`a`Ubm\][\Yf`
level operators in order to ease the development of
data parallel applications. As a generic data processing
d`UhZ`fa`]h`Ug`YbUV`YX`XYj`Y`cda`YbhcZa`Ubm\][\Yf`
`Yj`Y`hcc`g`gi`W`Ug`]bhYfUW]j`Y`GE`@fGdUf_`GE`@zFYU`h]a`Y`
ghfYUa`]b[`fGdUf_`GhfYUa`]b[kza`UW`]bY`YUfb]b["]VfUfm
fA`@VzZF!cb!GdUf_`YH`W`



PLATFORMS *continued*

5dUWY? m]b f_l]m]b"]c]t]g]Ub`cdYb`gci fW`UbU`nm]Vg`gc`i h]cb`Zfca`Y6Um`bW]h`UhYbUV`Yg`GE`@VUgYX`a`i`h]X]a`Ybg]cbU`UbU`n]g]g`fC`@5D]c]b`j`Yfmi]Uf[`Y`XUH]gYhg`?`m]b`]g]b]h]b]XYX`tc`VY`U`<`UXccd`VUgYX`\\n]Vf]X`C`@5D`fk`C`@5D]c]g`c`i`h]cb`h`Uhk`j`Y`Y`b]h`U`m]g]i`ddcf]hVch`A`C`@5D`UbX`FC`@5D`ghm]Y`a`i`h]X]a`Ybg]cbU`UbU`n]g]g`K`]h`?`m]b`m]c]i`W]b`XY`bY`W`VYg`i`g]b[`U`7]i`VY`8Yg]l`bYf`UbX`]b]h]U]Y`Ub`c`]bY`dfcW`gg`h`UhVi`]Xg`h`YgY`W`VYg`H`Y`c`]bY`dfcW`gg`dYfZ`cfa`g`U`d`fY`i`c]b`ghYd`tc`c]b`ZUM]g`UbX`X]a`Ybg]cb`hUV`Yg]b]c]U`U`UH]Y`bYX`ci`hg]fi`V]i`fY`H`]g]g]Z`c`ck`YX`VmU`dYf]U`[`fY[`Uh]cb`d`UgY`k`\\YfY`]b]X]j`]Xi`U`W`Vc]Xg]UfY`Vi`]hi`g]b[`A`Ud`FYXi`W`c]Vg`H`Y`fYg]i`hg`UfY`ghc`fYX`]b`<`8`G`gYei`YbW`Y`g`UbX`UfY`UH]f`c`UXYX`]b]c`<`6Ug`H`Y`XUH]Y`fYei`Yg]g`W]b`c]f]l`]b]U]Y`Zfca`GE`@g]i`Va`]h]YX`i`g]b[`U`GE`@VUgYX`tc`H`Y`ei`Yfm`Yb]l`]bY`fVUgYX`cb`**5dUWY 7UW]V]h]z`XYH]fa`]b]Yg]Z`h`Y`hUf[`YhXUH]gYhYi`]g]g]b`<`6Ug`Zgc`z`h`Y`Yb]l`]bY`X]fYV]m]i`UW]V]g]g]Y`h`Y`hUf[`YhXUH]Zfca`<`6Ug`UbX`fYh`fbg`h`Y`fYg]i`h`k`]h`g]i`V]g]YV]b`X`UH]Y`b]W]i`Zbch`z`h`Y`Yb]l`]bY`fci`h]g`h`Y`ei`Yf]Yg]tc`**Hive** f]f`U`b]m]c]h`Yf`GE`@cb`<`UXccd`gc`i`h]cb`YbUV`YX`cb`h`Y`W`gh]f]e`**

CoreCLR f]l`]h`i`V`V]c]a`#`X`c]h]b]Y`h]c]f]Y`W]f]U`b]X`**CoreFX** f]l`]h`i`V`V]c]a`#`X`c]h]b]Y`h]c]f]Y`Z`]g]h`Y`V]c]f]Y`d`U]h]z`c]fa`UbX`ZfUa`Yk`cf`_`Zc]f`"B`9H`5`h]c]i`[`\\`b`c]h]b]Yk`z`h`Y`m`U]j`Y`fYV]b]h]m]VY]b`cdYb`gci`fW]X`Vm]a`]V]c]g]c]Z`i`5`_`Y]m]V]U]b[`Y`]g]h`Uh]h`Y`g]Y`XYd`Yb`XYb`V]V]g]UfY`V]b]!`XYd`c]m]U`Y`z`h`Y`m]X`c`not`need`to`be`installed`on`a`machine`in`advance`. This`YUgYg]g]XY!`V]m]g]XY`XYd`c]m]a`Yb]hg]z`U`ck`]b[`Udd`]W]h]c]b]g]tc`i`gY`X]`YfYb]h]ZfUa`Yk`cf`_`j`Yfg]c]b]g]k`]h]c]i`h]V]c]b`]M]g`Gca`Yh`]b[`k`f]h]Y]b`]b`"B`9H`]g]h`Y`b`]b`]a`d`Ya`Yb]h]c]b`XYH]j]z`n]c]i`W]b`]b]g]h]U`"B`9H`XYd`Yb`XYb`V]m]b]c]b]c]U]b]m]Y]b]j]f]c]b]a`Yb]h`5`"B`9H`tc`c]`]g]b`c]X]`YfYb]h]U]b`g]ca`Yh`]b[`k`f]h]Y]b`]b`7`Zfca`Ub`Yi`h]f]b]U`XYd`Yb`XYb`V]m]d`Yf]g]d`YV]m]j`Y]z`a`U`_`b[`]h]U`a`i`W`a`c]fY`UH]f]U]M]j`Y`c]d]h]c]b`Zc]f[`Yb]YfU`di`f]d]c]g]Y`Udd`]W]h]c]b]g]Ub]X`i`h]h]Y]g`7`c]f]Y`L`]g]U`g]c`VY]b[`ZUM]c]fYX`]b]c`]b]X]j`]Xi`U`B]i`;`Yh]XYd`Yb`XYb`V]V]g]z`gc`h`Uh`Udd`]W]h]c]b]g]W]b`di`k`\\`Uh]h`Y`m]b]Y]X]z`_`Y]d]b[`h`Y`Zc]c]h]d]f]b]h]Zc]f`"B`9H`Udd`]W]h]c]b]g]Ub]X`]V]f]Uf]Y]g]ga`U`_`Ub]X`a`U`_`b[`]h]Y]U]g]Y]f`tc`fYd`UW`d`U]f]h]c]Z]h`Y`ZfUa`Yk`cf`_`

<Yfc_j`z`k`]h`]hg`%&]ZUM]c]f`Udd`]W]h]c]b`a`cXY`z`\\`Ug`W]U]b[`YX`h`Y`k`Um]k`Y`h`]b`_`UV]c]i`hVi`]X]b[`z`XYd`c]n]b[`z`Ub]X`hosting`web`applications`. **Deis** f]d]e]i]s]i]o]e]Y]b]W]d]g]i`UH]g]h`Y`<Yfc_j`DUUG`a`cXY`]b`Ub`cdYb]gci`fW`ZfUa`Yk`cf`_`h`Uh`XYd`c]m]g]c]b]c`8`c]W]Y]f`V]c]b]h]j]b]Y]f]g`\\`c]g]h]X`U]b]n]k`\\`Y]fY`"8`Y]g`]g]g]h`Y`j`c]j`]b[`z`Vi`h]Zc]f`Udd`]W]h]c]b]g]h`Uh`h`h`Y`%&]ZUM]c]f`a`cXY`]h`\\`U]g]h`Y`d`c]h]b]h]U`tc`[`fYU]h]m]g]a`d`]z`m]X]Yd`c]m]a`Yb]h]Ub]X`\\`c]g]h]b[`]b`h`Y`Y]b]j]f]c]b]a`Yb]h]c]Z]m]c]i`f`W]c]i]W`"8`Y]g]g]n]Y]h]U]b]c]h]Y]f`Yi`Ua`d`Y`c]Z]h`Y`f]W]Y`V]c]g]n]g]h]Y`a`c]Zd`U]h]z`c]fa`g`Ub]X`tc`c]g]Ya`Yf[`]b[`U]f]c]i`b]X`8`c]W]Y]f`"

DfYX]M]j]Y`UbU`nm]Vg`UfY`i`gYX`]b`a`c]fY`Ub]X`a`c]fY`d]f]c]Xi`W]g]z`c]Z]h]b`X]fYV]m]i]b`Yb]X]i`gYf`ZUM]b[`Z`i`b]W]m]c]b]U`]h]m]i`**H2O** f]X]c]V]g`S]i`XUH]U`V]c]a`_`]g]U]b`]b]h]Y]f]Y]g]h]b[`b]Yk`cdYb`gci`fW`dUW]U[`Y`fk`]h`U`gh]U]f]h`d`VY`\\`]b]X`]h]c]h`U]h]a`U`_`Y]g]d]f]Y]X]M]j]Y`UbU`nm]Vg`UW]V]g]g]V`Y`tc`d]f]c`Y`V]h]Y`U]a`g`Xi`Y`tc`]hg`Y`U]g]m]h]c]!`use`user`interface`. At`the`same`time`it`integrates`with`h`Y`XUH]U`g]V]Y]b]h]g]h]g`Z]j`c]f]h]Y`tc`c`g]z`F`Ub]X`D]n]h]c]b]z`U]g]k`Y`U]g`<`UXccd`Ub]X`GdUf`_`"hc`Yfg[`fYU]h]d]Y]f]Z]c]fa`Ub]W`Ub]X]z`]b]c]i`f`Y]i`d]Y]f]Y]b]W]z]Y]U]g]m]b]h]Y`[`f]U]h]c]b`U]h]f]i`b]h]j]a`Y]z]Y]g]d]Y]V]U`m`c]b`_`]A`!`V]U]g]Y]X`d`U]h]z`c]fa`g`"

K`\\`Y]b`C`f]U]W`W]U]g]Y]X`Y]j`Y`c]d]a`Y]b]h]c]b`G]i`b`g]C`d]Y]b]G]G]C`Ub`cdYb`gci`fW`UW]V]g]g]a`Ub]U[`Ya`Y]b]h]d`U]h]z`c]fa`hk`U]g`d]W]Y]X`i`d`V]m]i`c]f[`Y]f]c]W]Ub]X`]b]h]Y`[`f]U]h]Y]X`]b]c]h`Y`]f]C`d]Y]b`XY]b]h]m]G]i`h]Y`"B`c]k`b]U]a`Y]X`**CdYb5A** f]Z]c]f[`Y]f]c]W]V]c]a`#`d]f]c]Xi`W]g]z`c]d]Y]b!]`X]Y]b]h]m]g]h]U]W`#`c]d]Y]b]U]a`_`]z]h`"g`h`Y`b]W]V]Y`for`a`scalable`,`open-source`platform`that`supports`C]d]Y]b`8`7`c]b]b]V]m]U]b]X`G]5]A`&`&`\$`"<`c]k`Y]j`Y]f]z`C]d]Y]b]5]A`g`_`c]b[`\\`]g]h]c]f]m`U]g]f]Y]g]i`h]Y]X`]b`U`g]d]f]U]k`]b[`V]c]X]Y]V]U]g]Y`k`\\`c]g]Y`X]c]W]a`Y]b]h]c]b`W]b`V]Y`]b]g]V]i`h]U]V]Y`"<`c]d]Y]z`"n]z`U]g]j]a`a`Y]X`down`alternative`with`better`support`for`automated`XYd`c]m]a`Y]b]h]U]b]X`d]f]c]j`]g]c]b]b[`k`]j`Ya`Yf[`Y`g]c]c]b`"

GdUf_ f]g]d]U]f`_`]c]t]g]U]z`"ghUW`gc`i`h]cb`Zc]f`W]c]i`X`connected`devices`. **GdUf_`D]`c]h]c]b** is`a`microcontroller`k`]h`k`]`a`c]Xi`Y`"GdUf_`9`V]m]f]c]b`is`a`variant`that`V]c]b]b]V]m]g]tc`U`W`i`U]f`b]Y]h]k`c]f`_`GdUf`_`C`G`U]X]X]g`F`9`G]H`5D`tc`h`Y`X]Y]j`]W]g`"H`]g]g]j]a`d`]`Y]g`h`Y`Y]b]f]m]i]c`c]h`U]b]X`Vi`]X]b[`m]c]i`f`c]k`b`V]c]b]b]V]m]X`X]Y]j`]W]g`"

A`h]j]a`Y`g]Y]f]Y]g`XUH]U]V]U]g]Y`f]h]G]8`6]E]g]U`g]n]g]h]Y]a`h`Uh]g`] optimized`for`handling`time`series`data`. It`allows`users`tc`d]Y]f]Z]c]fa`7]F]I`8`c]d]Y]f]U]h]c]b]g]c]b]j`U]f]c]i`g]h]j]a`Y`g]Y]f]Y]g`organized`as`database`objects`. It`also`provides`the`UV`]h]m]i]c`d]Y]f]Z]c]fa`g]h]U]h]g]h]W`W]W`U]h]c]b]g]c]b`h`Y`g]Y]f]Y]g`U]g]U]k`\\`c`Y`"5`h]c]i`[`\\`H]G]8`6]g]U]f]Y`b]c]h]Y]b]h]f]Y`m]U`b]Yk`h]V]W]b]c`c[`m]k`Y`U]f]Y`g]Y]Y]b[`U`f]Y]b]Y]k`Y]X`]b]h]Y]f]Y]g]h]b`h`Y`h`Y`g]Y`XUH]U]V]U]g]Y]g]d]f]a`U]f]m]b]h`Y`Y`U]a`c]Z`c]h]U]d]d`]W]h]c]b]g`"H`]g`]g]V]Y]b[`ZUM]j]h]U]h]X`V]m]a`U]b]m]c]d]Y]b`gci`fW`Ub]X`V]c]a`a`Y]f]V]U`d`U]h]z`c]fa`g]f]j]i`W`U]g`**CdYbH86**,`**b`i`l`86**,`**Druid**,`**6`i`Y`c]X]86** Y]h]W]c]h`Uh`U]j`Y`a`i`g]V]f]c]ca`Y]X`f]Y]W]b]h]m]i`hg`U]gc`k`c]f]h`a`Y]b]h]c]b]b[`h`Uh]g]ca`Y`c]Z]h`Y]g]Y`g]n]g]h]Y]a`g]i`g]Y`other`distributed`databases`such`**Cassandra**`and`**HBase**`U]g]h`Y]f]i`b]X]Y]f]m]b[`g]h]c]f]U[`Y`Y]b[`]b]Y`"

TOOLS *continued*

dXZa U_Y f] h i V"Vta #vdUa di W #dXZa U_YE]g'U
Uj UGVW]dh"VfUfmk \]W U'ck gZcf WYU]cb UbX'df]bh]b[
cZD8: XcW'a YbhgX]fYV]m]b h Y Vfc gYf" Hc i gY'
dXZa U_Ynci Vtbgf] V]U'XcW'a YbhcV'YV]hUhg ddcfhg'
structural elements such as tables, columns, and rich
gm]b[žh Yb \Y'dYf'a Yh.cXgV]b WYU] UbX'df]bhcf'
Xck b'cUX'U'D8: k]h ci h'YUj]b[W]Ybhg]XY'Uj UGVW]dh'

8Yj Y'cd]b[U'gcZk UfY'gnghYa Vm fghWYU]b[U'Uf[Y'
number of detailed diagrams is an approach that, in
ci fYI dYf]YbWZcYg'bhVta dUfY Z]j cfUV'mhc h'Y'
U'hYfbU]h] Yg"<ck YfZXYgV]V]b[U'dUf]W U'f'mVta d'YI'
UbX]b]f]W]h' dUfhcZ h Y'gnghYa k]h U'X]U[fUa]gi gi U'mi
U[ccX]XYUzUbX'h Y' A @]hgY'Zc YfgU'bi a VYf'cZi gYz'
UbX Vta a cb'mi bXYfghcX'X]U[fUa g"K Y"]_Y'D'UbH A @
f]plantuml.sourceforge.netZcf WYU]b[h YgY'X]U[fUa g:
VYV]i gY]hU'ck gYI dYfg]b[h Y]bhYbhVY\]bX'h Y'
X]U[fUa g]b U'WUf'hYI h U'Zcfa žk]h ci h\Uj]b['tc' XX'Y'
k]h 'cj Yf'cUXYX [fUd\]W' hcc'g"<Uj]b[U'hYI h U'Zcfa U'gc'
allows versioning and storage alongside the source code.

Gci bX7'ci X\Uj Y'fYWbhmc dYb'gci fWX'U': fUd\]hY'
replacement, **Prometheus** f]prometheus.ioŽ8Yj Y'cdYX'
Ug'U'fYU]cb'hc X] W'h]Yg'k]h'; **fUd\]hY** in their
dfcXi V]cb'gnghYa gZDfca YhYi g'k cf_gX] YfYbhimhc'
; fUd\]hYzVmdf]a Uf]mgi ddcfh]b[U'di ``!VUgYX'<HHD'
a cXY' fU'h ci [\ U'a cfY'; fUd\]hY']_Y'di g\ 'a cXY']g'
U'gc gi ddcfhYX'E" hU'gc [cYg'VYncbX'; fUd\]hY VmVY]b['
built to support alerting based on captured metrics, so
]hVYVta Yg'U'a i W'a cfY U]V] Y dUfhcZmci f'cdYfU]cbU'

hcc'gYh" Gca Y'W]i h]cb'g\ci X'VY'i gYX]b UXcdh]b['bYk'
hYV]bc'c[m]b h Y d'fcXi V]cb'a cb]hc]b['gdUWZVi h'
YUf'mfYdcfhg'UfY'h UhGci bX7'ci X'UfY\Uddmi g]b[]h]b'
dfcXi V]cbzUbX'8cW_Yf'UfY U'gc Vt'bf]Vi h]b['tc'cb[c]b['
development.

E i]W' f] h i V"Vta #E i]W#E i]W]E]g'U'hYgh]b['ZfUa Yk cf_
Zcf'Gk]ZhUbX'CV'YV]j Y!7žk \]W Vta Yg'Vi bX'YX k]h'
B]a V'YzU'a U'hY'f'ZfUa Yk cf_'Zcf'hYghg"E i]W\Y'dg:
j Yf]Zh'h Y VY\Uj]cf'cZGk]ZhUbX'CV'YV]j Y!7' d'fc[fUa g"
E i]W\Ug'h Y'gUa Y'gnb]U]V]W Uj cf'Ug **F GdYW** and
Jasmine UbX]g'YUgnhc'gYh'i d'" h]g] Yfmc]f[Ub]nYXz'
U'ck g'Zcf UggYf]h]cb'cZ]m]Yg'UbX'a U_Yg]hYUgnhc' hYgh'
Ugnb]W'fcbci g'Vt'XY"

G]W'f]m]a cb_Ym]f] h i V"Vta #B Yh]i #gYV]f]m]Sa cb_Ym]t'
]g'Ubch'Yf' hcc']b' B Yh]i g'G]a]Ub'5fa nžk \]W]g'U'
gi]hY'cZ hcc'g'XYg] bYX'hc Ybgi fY'h UhgnghYa g'UfY'
being built in a resilient fashion. As well as providing
U'fVt'b [i fUV'Y'UggYgga YbhcZUbm]dch]bh]U'gYV]f]m]i
j i 'bYfUV]]h]Yg]b'nci f'5K G'gYh dž]hW]b'U'gc VY'i gYX'hc'
a cb]hc]f'W'Ub[Yg'cb'Ub'cb[c]b['VUg]gžU'Yf]h]b['X] YfYbh'
A A A A Q A 4 A ghú

LANGUAGES & FRAMEWORKS

G]bW`k Y`UghU`_YX`UVci hNancy fbUbWzL "cf[kcb`h Y`
hVW.bc`c[mfUXUf`h`UgVYVta Y`h Y`XYZLi`hWc]W`cb`
ci f`"B 9Hdfc YVtg"5fVW]hVMI fYgWbhfYX`Ufci bX`ga U`z
j Yfh]W`g]Wg`UbX`a]WcgYfj]Wg]ja d`mfYei]fY`][`h
k Y][`hXYd`cna` Ybhdh]cbg`UbX`ck`WfYa cbmfc`]b["

CbY VYbY` hfc`h Y`cb[c]b[`Uj U`UbWY`cZ`ZcbHYbX`
`Uj UGW]dhZUa Yk cf_g]g`h UhicWUg]cbU`nzU`bYk`]XYU`
Wcdgi d`h Uha U`Ygi`g`h]b`"FYUM`g`fZUWVcc`"]h`i`V`
]c#FYUM`g]U` #]Yk`ZUa Yk cf_]b`k` \]W`Uj UGW]dh`
Z`bV]cbg[YbYfUhy`<HA`@]b`U`fYUM]j`Y`XUHU`ck`"K`Y`
have seen several smaller projects achieve success
k]h`FYUM`g`UbX`XYj`Y`cdYfg`UfY`XfUk`b`h`]hg`WUUbz`
composeable approach to componentization.

Gdf]b[`6cch]f]fc`YVtg`gdf]b[]c#gdf]b[!Vcch`U`ck`g`
YUgm]Yhi`d`cZg`UbXU`cbY`Gdf]b[!VUgYX`Udd`]W]h]cbg`
hg]XYU`Zcf`di`]b[`i`d`bYk`a`]WcgYfj]Wg`UbX`YUgm]h`
XYd`cm`h`Ugc`a`U`Yg`XUHU`UWVgg`Ygg`cZU`dU]b`Xi`Y`h`
the hibernate mappings with much less boilerplate code.
K`Y`_Y`h`UhGdf]b[`6cch]g]a`d`]`Yg`Uj`UgYfj]WgVi`]h`
k]h`Gdf]b[zVi`h`Uj`Y`YUfbYX`h`VY`Wi`h]ci`g`cZ`h`Y`a`Ubm`
XYdYbXYbVYg`Gdf]b[]g]`"i`f_g`f`ghVYbYUH`h`Y`gi`fZUW`

K]XYgdfYUX`i`gU`Y`cZ5b[]i`Uf`G`V`b]bi`Y`g`cb`
H`ci` [`h`k`cf_g`dfc`YVtg`Z`U`h`ci` [`b`ch]Y`Yfm]Y`dYf]YbW`]g`
dcg]h]j`Y`"K`Y`V`b]bi`Y`h`U`Xj`]gY`h`Y`Ua`g`h`UggYgg`k` \Y`h`Yf`
h`Y`UXX]h]cbU`V`ta`d`Yi`]hmcZU`g]b[`Y`idU`Y`Uj`UGW]dh`
Udd`]W]h]cb`]g`bYW`ggUf]m]c`a`Y`Yh`h`Y`f`f`Yei`]f`Y`a`Y`b`hg`"K`Y`
Ugc`f`YV`ta`a`Y`b`X`UggYgg]b[`U`h`f`b`U`h]j`Y`Z`Ua`Yk`cf_gz`UbX`
in this radar edition we highlight 9a VYf`"g`femberjs.com`
k` \]W`]g[`fck]b[`]b`dcdi`Uf]m]k`]h`]b`h`ci` [`h`k`cf_g`
9a VYf`]g`dfU]gYX`Zcf`]hg`UddfcUW`c`Zcd]b]cbU`h`YX`
V`bj`Y`b]h]cb`c]j`Yf`V`tb` [`i`f`U`h]cbz`f`Ygdc]b]j]Y`V`f`Y`h`Ua`c`Z`
committers, performance, and build tooling support via
9a VYf`7@`"

b`h`Y`W`ck`XYX`gdUW`c`Z`Uj`UGW]dhZUa`Yk`cf_gz`k`Y`k`Ubh`
to highlight : `][`h`h`g]f]j][`h`g][`]h`i`V`]c`k`Ug`U`][`h`k`Y][`h`
Z`Ua`Yk`cf_`h`Vi`]X`V`ta`dcbYb]hg": `][`h`[`Y`hg`V`mk`]h`ci`h`i`
a`i`W`a`U`[`W`k` \Y`b`UXX]b[`VY`Uj`]cf`h`8CA`b`c`XYg`"hg`

event-driven and component-based nature promotes
k`f]h]b[`XYV`ta`d`YX`V`XY`"h`]g`a`U`Y`g`h`g]h]b[`]b`X]j`]Xi`U`
V`ta`dcbYb]hg`V`ta`dUfU]h]j`Y`m`Y`Ugm]7UfY`a`i`ghVY`hU`Yb`z`
however, when components need to interact with each
other. There is little support for testing and a real
XUb[Yf`h`[`Yh]b]h`Yj`Y`b`h`Y`"K`Y`Xc`_Y`h`U`h]h]i`g`Yg`
Z`b`V]cbU`a`]i`]bg`Zcf`VY`Uj`]cfz`_Y`V`ta`dcb]h]cb`]bghYUX`
of inheritance.

K]h`gca`Y`fYU`!k`cf`X`Yi`dYf]YbW`i`bXYf`ci`f`VY`h`Gk`]Zh`
fXYj`Y`cdYf`Udd`Y`V`ta`#gk`]Z`h]g]`"g`lck`g`U`chcZdfca`]gY`"
Gca`Y`c`Z`h`Y`dfcV`Ya`gz`_Y`cb[`V`ta`d]Y`h]a`Y`gz`UfY`
being addressed. However, continued language changes
W]i`g`Y`i`h`z`

H\ci [\HK cf_g]g'U'gcZk UfY Wta dUbmUbX Wta a i b]mi