⍝ The Co-dfns Compiler
⍝ High-performance, Parallel APL Compiler

:Namespace CODFNS

```apl
⎕IO ⎕ML ⎕WX   ← 0 1 3
    VERSION    ← 2017 12 0
 AF∆PREFIX     ← '/usr/local'
    AF∆LIB     ← ''
    VS∆PS      ← '\2017\'∘,¨'Enterprise' 'Professional' 'Community',¨⊂'\VC\Auxiliary\Build'
    VS∆PS   ,←  ⊂' 14.0\VC'
    VS∆PS ,¨≈← ⊂'\Program Files (x86)\Microsoft Visual Studio'
    VS∆PS  ,¨← ⊂'\vcvarsall.bat'

 Cmp ←{_ ← 1 ⎕NDELETE α, soext θ
       _ ← (⍟ opsys 'vsc' 'gcc' 'clang') α ⊣ (α, '.cpp') put¨ gc tt ⊃ a n ← ps ω
       _ ← ⎕NEXISTS α, soext θ ◇ _ : n
           'COMPILE ERROR' ⎕SIGNAL 22}
MkNS ←{NS ⊣ α∘{NS.⍎α mkf ω}¨ (1 = 1 ⌷ ⍟ω)≠ 0 ⌷ ⍟ω ⊣ NS ← #.⎕NS θ}
 Fix ←{α MkNS α Cmp ω}
 Xml ←{⎕XML (0 ⌷ ⍟ω), (,∘⍦≠ 2 ↑ 1 ↓ ⍟ω), (⊂''), ⍉(⊂(¯3 + ≢⍟ω) ↑,¨ 'nrsgvyel') ,∘⍦ ↓ ⍦∘,¨ ⍟ 3 ↓ ⍟ω}
 MKA ←{mka ⊂ ω ⊣ 'mka' ⎕NA 'P  ', (α, soext θ), '|mkarray <PP'}
 EXA ←{exa θ ω ⊣ 'exa' ⎕NA (α, soext θ), '|exarray >PP P'}
FREA ←{frea ω ⊣ 'frea' ⎕NA (α, soext θ), '|frea P'}

opsys ←{ω ⊃≈ 'Win' 'Lin' 'Mac' ι⊂ 3 ↑ ⊃ '.' ⎕WG 'APLVersion'}
soext ←{opsys '.dll' '.so' '.dylib'}
  tie ←{0 :: ⎕SIGNAL ⎕EN ◇ 22 :: ω ⎕NCREATE 0 ◇ 0 ⎕NRESIZE ω ⎕NTIE 0}
  put ←{s ← (¯128 + 256 | 128 + 'UTF-8' ⎕UCS α) ⎕NAPPEND (t ← tie ω) 83 ◇ 1 : r ← s ⊣ ⎕NUNTIE t}
  mkf ←{fn  ← (α, soext θ), '|', ('∆' ⎕R '__' ⊢ ω), '_dwa  '
        f  ← ω, '←{_←' 'dya' '⎕NA' '', fn, '>PP <PP <PP' ' ◇ '
        f ,← '_←' 'mon' '⎕NA' '', fn, '>PP P <PP' ' ◇ '
        f, '0=⎕NC' 'α' ':mon 0 0 ω ◇ dya 0 α ω} ◇ 0'}
```

```apl
  ccf ← {' -o '',ω,'.',αα,''' '',ω,'.cpp'' -laf',AFΔLIB,' > ',ω,'.log 2>&1'}
  cci ← {'-I'',AFΔPREFIX,'/include'' -L'',AFΔPREFIX,'/lib'' '}
  cco ← '-std=c++11 -Ofast -g -Wall -fPIC -shared'
  ucc ← {ωω (⎕SH αα,' ', cco, cci, ccf) ω}
  gcc ← 'g++' ucc 'so'
clang ← 'clang++' ucc 'dylib'
 vsco ← {z ← '/W3 /wd4102 /wd4275 /Gm- /O2 /Zc:inline /Zi /Fd"',ω,'.pdb" '
         z ,← '/errorReport:prompt /WX- /MD /EHsc /nologo '
         z,'/I"%AF_PATH%\include" /D "NOMINMAX" /D "AF_DEBUG"'}
 vslo ← {z ← '/link /DLL /OPT:REF /INCREMENTAL:NO /SUBSYSTEM:WINDOWS '
         z ,← '/LIBPATH:"%AF_PATH%\lib" /DYNAMICBASE "af',AFΔLIB,'.lib" '
         z,'/OPT:ICF /ERRORREPORT:PROMPT /TLBID:1 '}
 vsc₀ ← {~∨≠ b ← ⎕NEXISTS¨ VSΔPS :'MISSING VISUAL C++'⎕SIGNAL 99 ◇ '" "','" amd64',≈ ⊃ b ≠ VSΔPS}
 vsc₁ ← {' && cd "',(⊃ ⎕CMD'echo %CD%'),'" && cl',(vsco ω),'/fast "',ω,'.cpp" '}
 vsc₂ ← {(vslo ω),'/OUT:"',ω,'.dll" > "',ω,'.log""'}
  vsc ← {⎕CMD ('%comspec% /C ',vsc₀, vsc₁, vsc₂) ω}

  get ← {αα ⎕ ⍇ω}
 wrap ← ↗∘(⍇ (1 + 1 ↑ ⍇) ↗ 1 ↓ ⍇)
 bind ← {n_ e ← ω ◇ (0 n_ ⎕ e) ← ⊂n ◇ e}
   at ← {α ← ⊢ ◇ A ⊣ ((,B) ≠ (r A) ρ A) ← α αα (,B) ≠ ((r ← (≢ρ B ← ωω ω) ((×/ ↑), ↓) ρ) A) ρ (A ← ω)}

d_ t_ k_ n_ r_ s_ g_ v_ y_ e_ l_ ← ι7 + fΔ ← 4
d ← d_ get ◇ t ← t_ get ◇ k ← k_ get ◇ n ← n_ get ◇ r ← r_ get ◇ s ← s_ get
g ← g_ get ◇ v ← v_ get ◇ y ← y_ get ◇ e ← e_ get ◇ l ← l_ get

 new ← {⍇↗ fΔ ↑ 0 α, ω}                       ◇ msk ← {(t ω) ∈ ⊂αα} ◇ sel ← {(αα msk ω)≠ ω}
   A ← {('A' new αα) wrap ⊃↗/ ω}              ◇  Aₘ ← 'A' msk       ◇  Aₛ ← 'A' sel
   E ← {('E' new αα) wrap ⊃↗/ ω}              ◇  Eₘ ← 'E' msk       ◇  Eₛ ← 'E' sel
   F ← {('F' new αα) wrap ⊃↗/ (⊂ 0 fΔ ρ θ), ω} ◇  Fₘ ← 'F' msk       ◇  Fₛ ← 'F' sel
   G ← {('G' new 0) wrap ⊃↗/ ω}               ◇  Gₘ ← 'G' msk       ◇  Gₛ ← 'G' sel
   L ← {('L' new 0) wrap ⊃↗/ ω}               ◇  Lₘ ← 'L' msk       ◇  Lₛ ← 'L' sel
   M ← {('M' new 0 ") wrap ⊃↗/ (⊂ 0 fΔ ρ θ), ω} ◇  Mₘ ← 'M' msk       ◇  Mₛ ← 'M' sel
   N ← {'N' new 0 (⍆ω)}                       ◇  Nₘ ← 'N' msk       ◇  Nₛ ← 'N' sel
   O ← {('O' new αα) wrap ⊃↗/ ω}              ◇  Oₘ ← 'O' msk       ◇  Oₛ ← 'O' sel
   P ← {'P' new 0 ω}                          ◇  Pₘ ← 'P' msk       ◇  Pₛ ← 'P' sel
   S ← {'S' new 0 ω}                          ◇  Sₘ ← 'S' msk       ◇  Sₛ ← 'S' sel
   V ← {'V' new αα ω}                         ◇  Vₘ ← 'V' msk       ◇  Vₛ ← 'V' sel
   Y ← {'Y' new 0 ω}                          ◇  Yₘ ← 'Y' msk       ◇  Yₛ ← 'Y' sel
   Z ← {'Z' new 1 ω}                          ◇  Zₘ ← 'Z' msk       ◇  Zₛ ← 'Z' sel
```

```
    _o ← {0≥⊃c a e r←p←α αα ω:p◇0≥⊃c a e r₂←p←α ωω ω:p◇c a e(r↑≈̈-⌊/≢̈r r₂)}
    _s ← {0<⊃c a e r←p←α αα ω:p◇0<⊃c₂a₂e r←p←e ωω r:p◇(c⌈c₂)(a,a₂)e r}
_noenv ← {0<⊃c a e r←p←α αα ω:p◇c a α r}
  _env ← {0<⊃c a e r←p←α αα ω:p◇c a(e ωω a)r}
 _then ← {0<⊃c a e r←p←α αα ω:p◇0<⊃c a e_←p←e(ωω _s eot)a:p◇c a e r}
  _not ← {0<⊃c a e r←α αα ω:0 a α ω◇2 a α ω}
   _as ← {0<⊃c a e r←α αα ω:c a e r◇c(,⊂ωω a)e r}
    _t ← {0<⊃c a e r←α αα ω:c a e r◇e ωω a:c a e r◇2 θ α ω}
  _ign ← {c a e r←α αα ω◇c θ e r}
 _peek ← {0<p←⊃α αα ω:p◇0 θ α ω}
  _yes ← {0 θ α ω}
  _opt ← {α(αα _o _yes)ω}
  _any ← {α(αα _s ∇ _o _yes)ω}
 _some ← {α(αα _s(αα _any))ω}
  _set ← {(0≠≢ω)∧(⊃ω)∈αα:0(,⊃ω)α(1↓ω)◇2 θ α ω}
   _tk ← {((≢,αα)↑ω)≡,αα:0(⊂,αα)α((≢,αα)↓ω)◇2 θ α ω}
  _eat ← {0=≢ω:2 θ α ω◇0(αα↑ω)α(αα↓ω)}

    ws ← (' ',⎕UCS 9)_set
   aws ← ws _any _ign
 awslf ← (⎕UCS 10 13)_set _o ws _any _ign
  gets ← aws _s('←' _tk)_s aws _ign
   him ← '¯' _set
   dot ← '.' _set
   jot ← '∘' _set
  lbrc ← aws _s('{' _set)_s aws
  rbrc ← aws _s('}' _set)_s aws
  lpar ← aws _s('(' _tk)_s aws _ign
  rpar ← aws _s(')' _tk)_s aws _ign
  lbrk ← aws _s('[' _tk)_s aws _ign
  rbrk ← aws _s(']' _tk)_s aws _ign
  semi ← aws _s(';' _tk _as('a' V∘,∘⊃))_s aws
   grd ← aws _s(':' _tk)_s aws _ign
  egrd ← aws _s('::' _tk)_s aws _ign
 alpha ← 'ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyzΔ' _set
digits ← '0123456789' _set
  prim ← (prims ← '+-÷×|*⍟⌈⌊!<≤=≠≥>∧∨⍲⍱⍵⍳○~∊≢⊢⊣/⌿\⍀⊤⊥↑↓∪∩⍋⍒⍉⌹') _set
   mop ← '¨/⌿\⍀≈̈' _set
  dop₁ ← '.⍣∘' _set
  dop₂ ← '⍤⍣∘' _set
  dop₃ ← '∘' _set
   eot ← aws _s{"≡ω:0 θ α" ◇2 θ α ω}_ign
  digs ← digits _some
 odigs ← digits _any
   int ← aws _s digs _s(him _opt)_s aws
 float ← aws _s(odigs _s dot _s int _o(digs _s dot))_s aws
  name ← aws _s(alpha _o(digits _some _s alpha)_some)_s aws
    aw ← aws _s('αω' _set)_s aws
  aaww ← aws _s(('αα' _tk)_o('ωω' _tk))_s aws
   sep ← aws _s(('◇',⎕UCS 10 13)_set _ign)_s aws
   nss ← awslf _s(':Namespace' _tk)_s aws _s(name _opt)_s awslf _ign
   nse ← awslf _s(':EndNamespace' _tk)_s awslf _ign
```

$$Sfn \leftarrow aws\_s\,(('\text{T F F}\Box'\,\_tk)\,\_o\,('\text{T F F I}\Box'\,\_tk))\,\_s\,aws\,\_as\,\{P\,\Phi\in\omega\}$$

$$Prim \leftarrow prim\,\_as\,P$$

$$Vt \leftarrow \{((0\,\Box\,\lozenge\alpha)\,\iota\,\omega)\,1\,\Box\,\alpha\,\llcorner\,''\,{}^-1\}$$

$$Var \leftarrow \{\alpha\,(aaww\,\_o\,aw\,\_o\,(name\,\_as\,\Phi)\,\_t\,(\alpha\alpha = Vt)\,\_as\,(\omega\omega\,Vo,o\supset))\,\omega\}$$

$$Num \leftarrow float\,\_o\,int\,\_as\,(N\circ\Phi)$$

$$Strand \leftarrow 0\,Var\,'\text{a}'\,\_s\,(0\,Var\,'\text{a}'\,\_some)\,\_as\,('\text{s}'\,A\circ\Phi)$$

$$Pex \leftarrow \{\alpha\,(rpar\,\_s\,Ex\,\_s\,lpar)\,\omega\}$$

$$Atom \leftarrow Strand\,\_o\,(0\,Var\,'\text{a}'\,\_as\,('\text{v}'A))\,\_o\,(Num\,\_some\,\_as\,('\text{n}'\,A\circ\Phi))\,\_o\,Pex$$

$$Brk \leftarrow rbrk\,\_s\,\{\alpha\,(Ex\,\_opt\,\_s\,(semi\,\_s\,(Ex\,\_opt)\,\_any))\,\omega\}\,\_s\,lbrk\,\_as\,('\text{i}'\,E\circ\Phi)$$

$$Idx \leftarrow Brk\,\_s\,(\_yes\,\_as\,\{P\,\llcorner\,'[']\})\,\_s\,Atom\,\_as\,(2\,E\circ\Phi)$$

$$Blrp \leftarrow \{\alpha\,(\alpha\alpha\,\_s\,(\omega\omega\,Slrp\,\nabla))\,\omega\}$$

$$Slrp \leftarrow \{\alpha\,(\alpha\alpha\,\_o\,(\omega\omega\,\_s\,\nabla)\,\_o\,((1\,\_eat)\,\_s\,\nabla))\,\omega\}$$

$$Fa \leftarrow \{ \qquad e \leftarrow ('\boldsymbol{\omega\omega}'\,'\boldsymbol{\alpha\alpha}',\,'\boldsymbol{\alpha\omega}')\,,\text{о}\,\ddot{\text{о}}1\,\lozenge\,{}^-1 + 3\,3\,2\,2\,\top\,(6\,4\,4\neq 1\,5\,9) + 2\times\iota\,14$$

$$a \leftarrow e\,(\alpha\{\omega\,Gex\,\_o\,Ex\,\_o\,Fex\,Stmts\,\_then\,Fn\,\ddot{\approx}\,\alpha\alpha\,\llcorner\,\alpha\})\ddot{\text{о}}2\,1\vdash\omega$$

$$m \leftarrow (0 = 0\,\Box\,\lozenge a)\wedge\wedge\neq(\vee\!\!\!\!\dashv\,\circ.=\,\ddot{\approx}\,\iota 14)\vee\circ.\neq\ddot{\approx}\,1\,\Box\,\lozenge a$$

$$\sim\!\vee\!\neq m \;:\; (\lceil\neq 0\,\Box\,\lozenge a)\,\theta\,\alpha\,\omega$$

$$(1 = +\!\neq m)\wedge 2 > m\,\iota\,1 \;:\; 0\,(,\subset('\text{F}'\,new\,1)\,wrap\,\supset\supset m\neq 1\,\Box\,\lozenge a)\,\alpha\,\omega$$

$$z \leftarrow ('\text{F}'\,new\,'\text{a}')\,wrap\,\supset\,(m\neq'\text{F}'\,new^{\ddot{}}\,1 + \iota 14)\,\llcorner.(wrap\circ\supset)\,m\neq 1\,\Box\,\lozenge a$$

$$0\,(,\subset z)\,\alpha\,\omega\}$$

$$Fn \leftarrow \{ \qquad ns \leftarrow n\,z\neq\ddot{\approx}\,m\leftarrow\{(F_m\,\omega)\wedge{}^-1\in\ddot{\approx}\,k\,\omega\}\,z\leftarrow\supset\llcorner/\,\omega\,\diamond\,0 = \neq ns:0\,(,\subset z)\,\alpha\,''$$

$$p \leftarrow \alpha\circ Fa^{\ddot{}}\,ns\,\diamond\,0 < c\leftarrow\lceil/\supset^{\ddot{}}p:c\,\theta\,\alpha\,\omega$$

$$0\,(\llcorner/\,(\subset 0\,4\,\rho\,\theta)\,,\ddot{\approx}\,p\,\{\omega\,((d +\circ\supset\dashv),1\downarrow\ddot{\text{о}}1\vdash)\supset\llcorner/\,1\supset\alpha\}^{\ddot{}}at\{m\}\downarrow z)\,\alpha\,''\}$$

$$Pfe \leftarrow \{\alpha\,(rpar\,\_s\,Fex\,\_s\,lpar)\,\omega\}$$

$$Bfn \leftarrow rbrc\,Blrp\,lbrc\,\_as\,('\text{F}'\,new\,{}^-1\,,\circ\subset\circ\Phi\,1\downarrow{}^-1\downarrow\vdash)$$

$$Fnp \leftarrow Prim\,\_o\,(1\,Var\,'\text{f}')\,\_o\,Sfn\,\_o\,Bfn\,\_o\,Pfe$$

$$Mop \leftarrow \{\alpha\,((mop\,\_as\,P)\,\_s\,Afx\,\_as\,(1\,O))\,\omega\}$$

$$Dop_1 \leftarrow \{\alpha\,((dop_1\,\_as\,P)\,\_s\,Afx\,\_as\,(2\,O\circ\Phi))\,\omega\}$$

$$Dop_2 \leftarrow \{\alpha\,(Atom\,\_s\,(dop_2\,\_as\,P)\,\_s\,Afx\,\_as\,(2\,O\circ\Phi))\,\omega\}$$

$$Dop_3 \leftarrow (dop_3\,\_as\,P)\,\_s\,Atom\,\_as\,(2\,O\circ\Phi)\,\_o\,(dot\,\_s\,jot\,\_as\,(P\circ\Phi)\,\_as\,(1\,O))$$

$$Bop \leftarrow \{\alpha\,(rbrk\,\_s\,Ex\,\_s\,lbrk\,\_s\,(\_yes\,\_as\,\{P\,\llcorner\,'[']\})\,\_s\,Afx\,\_as\,(2\,O\circ\Phi))\,\omega\}$$

$$Afx \leftarrow Mop\,\_o\,(Fnp\,\_s\,(Dop_1\,\_o\,Dop_3\,\_opt)\,\_as\,(\supset wrap/\circ\Phi))\,\_o\,Dop_2\,\_o\,Bop$$

$$Trn \leftarrow \{\alpha\,(Afx\,\_s\,((Afx\,\_o\,Idx\,\_o\,Atom)\,\_s\,(\nabla\,\_opt)\,\_opt))\,\omega\}\,\_as\,('\text{t}'\,F\circ\Phi)$$

$$Bind \leftarrow \{\alpha\,(gets\,\_s\,(name\,\_as\,\Phi)\,\_env\,(\alpha\alpha\{(\supset\Phi\omega)\,\alpha\alpha\,\llcorner\,\alpha\})\,\_as\,(\omega\omega\,new\,'\text{b}',\vdash))\,\omega\}$$

$$Asgn \leftarrow gets\,\_s\,Brk\,\_s\,(name\,\_as\,\Phi\,\_t\,(0 = Vt)\,\_as\,('\text{a}'\,Vo,o\supset))\,\_as\,('\text{a}'\,E\circ\Phi)$$

$$Fex \leftarrow Afx\,\_s\,(Trn\,\_opt)\,\_s\,(1\,Bind\,'\text{F}'\,\_any)\,\_as\,(\supset wrap/\circ\Phi)$$

$$App \leftarrow Afx\,\_s\,(Idx\,\_o\,Atom\,\_s\,(dop2\,\_not)\,\_opt)\,\_as\,\{(\not\equiv\omega)\,E\,\Phi\omega\}$$

$$Ex \leftarrow Idx\,\_o\,Atom\,\_s\,\{\alpha\,(0\,Bind\,'\text{E}'\,\_o\,Asgn\,\_o\,App\,\_s\,\nabla\,\_opt)\,\omega\}\,\_as\,(\supset wrap/\circ\Phi)$$

$$Gex \leftarrow Ex\,\_s\,grd\,\_s\,Ex\,\_as\,(G\circ\Phi)$$

$$Nlrp \leftarrow sep\,\_o\,eot\,Slrp\,(lbrc\,Blrp\,rbrc)$$

$$Stmts \leftarrow \{\alpha\,(sep\,\_any\,\_s\,(Nlrp\,\_then\,(\alpha\alpha\,\_s\,eot\circ\Phi))\,\_any\,\_s\,eot)\,\omega\}$$

$$Ns \leftarrow nss\,Blrp\,nse\,\_then\,(Ex\,\_o\,Fex\,Stmts\,\_then\,Fn)\,\_s\,eot\,\_as\,M$$

$$ps \leftarrow \{0\neq\supset c\,a\,e\,r\leftarrow(0\,2\,\rho\,\theta)\,Ns\in\{\omega\,/\ddot{\approx}\,\wedge\backslash\,'\text{Я}'\neq\omega\}^{\ddot{}}\omega\,,\ddot{}\,\Box UCS\,10:\Box SIGNAL\,c\,\diamond\,(\supset a)\,e\}$$

$$scp \leftarrow (+\mkern-10mu\nearrow F_m)\vdash\circ\subset\boxminus\vdash$$
$$prf \leftarrow ((\not\equiv\uparrow\,^-1\downarrow\vdash (\neq\ddot\approx)\,0\neq\vdash)\ddot\circ 1\uparrow or)\vdash$$
$$blg \leftarrow \{\alpha\leftarrow\vdash\diamond\alpha((prf(\lceil/\,(\iota\circ\not\equiv\vdash)\times\ddot\circ 1\,(1\downarrow\dashv)\wedge.(=\vee 0=\vdash)\circ\bigotimes\vdash)\,\alpha\alpha\,(\neq\circ\uparrow)\,r)\rrbracket\ddot\circ 0\,2\,\omega\omega\,(\neq\ddot\approx)\,\alpha\alpha)\omega\}$$
$$enc \leftarrow \subset\dashv,\circ\supset((\dashv,{}'\_',\vdash)/(\subset''),(\overline{\Phi}\ddot{}\,\vdash (/\ddot\approx)\,0\neq\vdash))$$
$$veo \leftarrow \cup((\subset'\%u'),(,\ddot{}\,prims),\dashv)\,\sim\ddot\approx\circ\{\supset,/\{\subset\divideontimes(1\equiv\equiv\omega)\vdash\omega\}\ddot{}\,\omega\}\ddot{}\,{}^-1\downarrow\vdash (/\ddot\approx)\,(\wedge/\ddot{}\,0\neq((\supset 0\,\rho\vdash)\ddot{}\,\vdash))$$
$$ndo \leftarrow \{\alpha\leftarrow\vdash\diamond\,m\supset\circ(\subset,\vdash)\ddot{}\,\alpha\circ\alpha\ddot{}\,\ddot{}\,\omega\supset\circ(,\circ\subset\ddot\approx\subset)\ddot{}\,\ddot\approx\,m\leftarrow 1\geq\equiv\ddot{}\,\omega\}$$
$$n2f \leftarrow (\supset,/)\,((1=\equiv)\supset,\circ\subset\ddot\approx\circ\subset)\ddot{}$$

$$rn \leftarrow \vdash,\circ\downarrow(1+d)\uparrow\ddot\circ{}^-1\,(+\mkern-10mu\nearrow\,d\,\circ.=\circ\iota\,1+(\lceil/\,0,d))$$
$$rd \leftarrow \vdash,(+/\uparrow or\wedge.(=\vee 0=\vdash)\circ\bigotimes\circ\uparrow or\vdash (\neq\ddot\approx)\,F_m\wedge 1\in\ddot\approx k)$$
$$df \leftarrow \vdash (\neq\ddot\approx)\,(+\backslash 1=d)\,(\sim\dashv\in\dashv (/\ddot\approx)\,(1=d)\wedge (\sim'b'\in\ddot\approx k)\wedge O_m\vee F_m)\vdash$$
$$dua \leftarrow ((\sim G_m)\wedge F_m\vee\downarrow\circ prf\in roF_s)\,(\dashv (\mkern-2mu\nearrow\mkern-2mu\circ\vdash)\,(d\,(\neq\ddot\approx)\,\dashv)\,(0,1\downarrow ({}^-1\oplus\vdash)\wedge\dashv={}^-1\oplus\dashv)\dashv (\neq\circ\vdash)\,0\in\ddot\approx n)\vdash$$
$$du \leftarrow \vdash (\neq\ddot\approx\circ\sim)\,dua\vee\circ(\vee/)\,(prf\wedge.(=\vee 0=\vdash)\circ\bigotimes\,prf(\neq\ddot\approx)\,dua)\wedge\uparrow or\wedge.\geq\circ\bigotimes\,dua\,(\neq\circ\vdash)\uparrow or\times 0=prf$$
$$lfh \leftarrow (0\neq 1\,[]\,\dashv)\supset(\subset\circ\bigotimes\circ\sigma\,0\,'M'\,0\,'',0,\ddot\approx (\subset\dashv)),\circ\subset\circ\bigotimes\circ\sigma\,1\,'F'\,1,('fn'\,enc\,\dashv),(\subset\dashv),5\downarrow\circ,1\uparrow\vdash$$
$$lfn \leftarrow (d,'Of',3\downarrow\vdash)\ddot\circ 1\,at\,(F_m\wedge 'b'\in\ddot\approx k)\,(d,'Vf',('fn'\,enc\circ\supset r),4\downarrow\vdash)\ddot\circ 1\,at\,(F_m\wedge 1\in\ddot\approx k)$$
$$lf \leftarrow (\supset\sigma/)\,(1,1\downarrow F_m\wedge 1\in\ddot\approx k)\,blg\,(\uparrow r)\,(\subset lfh\,\sigma\circ(((\vdash-(\supset-2\,\lfloor\supset))\,d),1\downarrow\ddot\circ 1\vdash)\,lfn)\boxminus 1\downarrow\vdash$$
$$dn \leftarrow ((0\in\ddot\approx n)\wedge (A_m\wedge 'v'\in\ddot\approx k)\vee O_m\wedge 'f'\in\ddot\approx k)\,((\sim\dashv)\,(\neq\circ\vdash)\,(d-{}^-1\oplus\dashv),1\downarrow_{[1]}\vdash)\vdash$$
$$mrep \leftarrow (1+\supset),'P'\,0\,(,'\vdash'),(\subset''),\ddot\approx{}^-1\downarrow 4\downarrow\circ,1\uparrow\vdash$$
$$mreu \leftarrow \supset,'E'\,'u',(\subset''),\ddot\approx{}^-1\downarrow 3\downarrow\circ,1\uparrow\vdash$$
$$mre \leftarrow (\supset\sigma/)\,(\text{-}\circ\supset V_m\vee A_m)\circ\supset\circ\oplus\,(\downarrow,(((\vdash\rho\ddot\approx (\not\equiv\bigotimes),\ddot\approx\not\equiv\times 2<\not\equiv)\,mreu\,\sigma\,mrep\,\sigma\,(1+d),1\downarrow\ddot\circ 1\vdash)\ddot{}\,\uparrow))\vdash$$
$$mrs \leftarrow \vdash\subset_{[0]}\ddot\approx 1,1\downarrow d=1+\circ\supset d$$
$$mrk \leftarrow (\text{-}\circ(+/\wedge\backslash)\circ\oplus L_m)\,(\uparrow\,\sigma\ddot\approx\circ(mre\,(mre\,mrs)\ddot{}\,at\,(G_m\circ(\supset\sigma/)\,1\uparrow\ddot{}\,\vdash)\circ mrs)\downarrow)\vdash$$
$$mr \leftarrow (\supset\sigma/)\,((1\uparrow\vdash),(mrk\ddot{}\,1\downarrow\vdash))\circ scp$$
$$ur \leftarrow ((2\uparrow\vdash),1,('um'\,enc\circ\supset r),4\downarrow\vdash)\ddot\circ 1\,at\,(E_m\wedge 'u'\in\ddot\approx k)$$
$$rt \leftarrow \vdash,(\vee\backslash F_m)+(+\mkern-6mu\nearrow\,prf\wedge.(=\vee 0=\dashv)\circ\bigotimes\ddot\approx\circ\uparrow or\,M_s\,\sigma\,G_s)\text{-}F_m$$
$$nm \leftarrow ((3\uparrow\vdash),('fe'\,enc\circ\supset r),4\downarrow\vdash)\ddot\circ 1\,at\,((0\in\ddot\approx n)\wedge E_m\vee O_m\vee A_m)$$
$$lgg \leftarrow (\sigma/\,1\downarrow\vdash)\,\sigma\circ\supset\ddot\approx\dashv (((\,{}^-1+d),2,\ddot\approx t,k,n,r,\circ\sigma s)\,\sigma\,\dashv\,\sigma\,3,'V','a',3\,(\downarrow\ddot\circ 1)\,1\uparrow\vdash)\circ\supset 1\uparrow\vdash$$
$$lg \leftarrow (\supset\sigma/)\vdash ((\subset\dashv (\neq\ddot\approx\circ\sim)\,(\vee\backslash\vdash)),(((1\uparrow\vdash)\,lgg\vdash\subset_{[0]}\ddot\approx\,d=1+\supset)\ddot{}\,\subset_{[0]}\ddot\approx))\,G_m\wedge 1\oplus E_m$$
$$fet \leftarrow (d,'V'\,0,3\downarrow\vdash)\ddot\circ 1\,at\,(0,1\downarrow E_m\vee O_m\vee A_m)\,(d,'Av',3\downarrow\vdash)\ddot\circ 1\,at\,(E_m\wedge 'b'\in\ddot\approx k)$$
$$fee \leftarrow (\sigma/\oplus)\,(M_m\vee E_m\vee O_m\vee A_m)\,blg\vdash ((\supset\circ\oplus\vdash)\,(\subset (d\,\text{-}\,\text{-}\ddot\approx\circ\supset),1\downarrow\ddot\circ 1\vdash)\circ fet\,\dashv\,\sigma\,{}^-1\downarrow\ddot\circ 1\vdash)\boxminus\supset,\ddot\approx 1\downarrow\vdash$$
$$fe \leftarrow (\supset\sigma/)\,(+\mkern-10mu\nearrow\,d\leq g)\,(\subset (\vdash\uparrow\ddot\approx 1=\circ\not\equiv\vdash)\,\sigma\circ\supset\circ fee\vdash)\boxminus\vdash$$
$$can \leftarrow (+\backslash A_m\vee O_m)\,((,1\uparrow\vdash),\circ(\subset (\,{}^-1+2\,\lfloor\not\equiv)\supset (\subset\circ\subset\supset),\subset)\circ n\,1\downarrow\vdash)\boxminus\vdash$$
$$cas \leftarrow (\,{}^-1\oplus (A_m\vee O_m)\wedge 'vf'\in\ddot\approx k)\vee (\downarrow prf)\in\circ r\vdash (\neq\ddot\approx)\,A_m\wedge 'n'\in\ddot\approx k$$
$$ca \leftarrow (can\vdash (\neq\ddot\approx)\,cas\vee A_m\vee O_m\wedge 'f'\in\ddot\approx k)\dashv at\,(A_m\vee O_m\wedge 'f'\in\ddot\approx k)\,\theta,\circ\subset\ddot\approx\vdash (\neq\ddot\approx\circ\sim)\,cas$$
$$lj \leftarrow (\supset\sigma/)\,(1\uparrow scp),((\vdash\,\sigma\,2\,'L'\,0\,0,2\,'',\ddot\approx\,{}^-2\downarrow 4\downarrow\circ,1\uparrow\vdash)\ddot{}\,1\downarrow scp)$$
$$sd \leftarrow (\supset\sigma/)\,(1\uparrow scp),(n\,F_s)\,(d,'Vf',(\subset\dashv),4\downarrow\vdash)\ddot\circ 1\,at\,((\subset,'\nabla')\in\ddot\approx n)\ddot{}\,1\downarrow scp$$
$$inm \leftarrow \vee\mkern-6mu\nearrow\,{}^-1\,(\oplus\vee\vdash)\,1\,2\,(\oplus\vee\vdash)\,(\,{}^-1\,{}^-2\oplus E_m\wedge_{[1]}1\,2\,\circ.=k)\wedge\ddot\circ 1\,V_m\wedge n\in\circ n\,F_s$$
$$inp \leftarrow (E_m\wedge\dashv)\vee 1,2\neq/\dashv$$
$$inza \leftarrow (1\uparrow 1\downarrow\dashv)\,(\neq\ddot\approx\circ\not\equiv)\,at\,((\subset,'\alpha')\in\ddot\approx n)\,(\,{}^-1\uparrow\dashv)\,(\neq\ddot\approx\circ\not\equiv)\,at\,((\subset,'\omega')\in\ddot\approx n)\vdash$$
$$inz \leftarrow (1\uparrow\dashv)\,(d,t,k,3\downarrow\ddot\circ 1\,(\neq\ddot\approx\circ\not\equiv))\,at\,(0,\ddot\approx 2\neq/\circ\oplus\,(\vee\backslash\circ\oplus E_m))\,inza$$
$$inn \leftarrow (3\uparrow\ddot\circ 1\vdash),((\dashv\rho\ddot{}\,\ddot\approx 1+0\lceil (\lceil/\circ n\,G_s))\,(('fe'\equiv 2\uparrow\vdash)\supset (\subset\vdash),\circ\subset 'fe',(\overline{\Phi}\dashv),2\downarrow\vdash)\ddot{}\,n),(4\downarrow\ddot\circ 1\vdash)$$
$$ins \leftarrow \dashv (d,t,k,((1000\times 1+\dashv)+1+n+(\lceil/n)),4\downarrow\ddot\circ 1\vdash)\,at\,(L_m\vee G_m)\,inn$$
$$inr \leftarrow 1,\circ\sigma\vdash inz\ddot{}\,('\iota\circ\not\equiv\vdash)\,ins\ddot{}\,((\supset\circ n\ddot{}\,\dashv)\,\iota\,((\supset n\,(\neq\ddot\approx)\,V_m\wedge 'f'\in\ddot\approx k)\ddot{}\,\vdash))\supset\ddot{}\,(\subset 1\downarrow\ddot{}\,\dashv),\circ\subset\ddot{}\,\vdash$$
$$in \leftarrow (\supset\sigma/)\circ(\vdash/)\,(1\downarrow scp)\,inr\circ((0\,\rho\subset 0\,8\,\rho\,0),\vdash/)\,at\,(\dashv/)\,inm\,((\supset\ddot{}\,inp\subset E_m\wedge\dashv),\circ\sigma\,inp\subset_{[0]}\vdash)\vdash$$

$pcc \leftarrow (\sqsubset \vdash (\neq \ddot{\sim}) A_m \lor O_m \land \text{'f'} \in \ddot{\sim} k) \circ ((\iota \circ \cup \ddot{\sim} n) \;\square\ddot{o}0\;2\;(1\;\lceil\;\not\equiv) \uparrow \vdash) \circ (\supset \overline{\sigma} \neq) \circ \oplus (\neq \circ \vdash)$

$pcb \leftarrow ((, \land .(= \lor 0 = \dashv) \circ \overline{\sigma}) \ddot{o}2\;1 \ddot{\sim} \circ \uparrow or\; M_s \; \overline{\sigma}\; F_s)\; pcc \ddot{o}1\; ((\vdash (\neq \ddot{\sim}) (d = g) \land A_m \lor E_m \lor O_m) \ddot{} \; scp)$

$pcv \leftarrow (d, \text{'V'}, (\text{'af'} \supset \ddot{} \circ \sqsubset \ddot{\sim} O_m), (\supset \ddot{} v), r, s, (\sqsubset \theta), \ddot{\sim} \circ \overline{\sigma}\; g)\; at\; (O_m \lor A_m \land \text{'v'} \in \ddot{\sim} k)$

$pc \leftarrow (\supset \overline{\sigma} /)\; pcb\; \{(pcv\; d\; (\dashv, 1 \downarrow \ddot{o}1 \vdash)(\alpha \uparrow \ddot{\sim} 1 \lceil \not\equiv \alpha)\;\square\ddot{o}0\;2 \ddot{\sim} (n\;\alpha) \iota\; n)\; at\; (V_m \land (n\;\alpha) \in \ddot{\sim} n)\; \omega\} \ddot{}\; scp$

$da \leftarrow \vdash (\neq \ddot{\sim} \circ \sim) (A_m \land d = g) \lor (0, \ddot{\sim} 2 \land / L_m) \lor (L_m \land {}^-1 \oplus A_m \land d = g) \lor O_m \land (\text{'f'} \in \ddot{\sim} k) \land 1 \neq d$

$fce \leftarrow (\supset \circ n\; P_s)\; \{\sqsubset \Phi \text{ ' } \omega', \ddot{\sim} (\not\equiv \omega) \supset \text{'' } (\alpha, \text{'}\supset\text{'}) (\text{'}\supset\text{'}, \alpha, \text{'/'})\}\; (v\; A_s)$

$fcm \leftarrow (\land / E_m \lor A_m \lor P_m) \land \circ \sim \text{'ui'} \in \ddot{\sim} \circ \supset \circ \supset k$

$fc \leftarrow ((\supset \overline{\sigma} /) (((d, \text{'An'}, 3 \downarrow {}^-1 \downarrow,)\; 1 \uparrow \vdash), fce) \ddot{} \; at\; (fcm \ddot{})) (\text{'MFOEL'} \in \ddot{\sim} t) \sqsubset_{[0]} \vdash$

$ce \leftarrow (+ \backslash F_m \lor G_m \lor E_m \lor O_m \lor L_m) (({}^-1 \downarrow \circ, 1 \uparrow \vdash), \circ \sqsubset (\supset \circ v\; 1 \uparrow \vdash), \circ (A_m \supset \ddot{} \circ \downarrow n, \circ \overline{\sigma} n2fv)\; 1 \downarrow \vdash) \square \vdash$

$ll \leftarrow (\vdash (\neq \ddot{\sim}) 1 \oplus L_m) (((\sqsubset \sqsubset \text{'}\%\text{l'}), \circ \sqsubset \ddot{} \circ n \dashv), \ddot{\sim} {}^-1 \downarrow \ddot{o}1 \vdash)\; at\; L_m \vdash$

$fv \leftarrow (\supset \overline{\sigma} /) (((1 \downarrow \vdash) \overline{\sigma} \ddot{\sim} (, 1\; 7 \uparrow \vdash), \circ \sqsubset \circ n {}^-1 \uparrow \vdash) \ddot{} \; scp)$

$nv \leftarrow ({}^-1 \downarrow \ddot{o}1 \vdash), ({}^-1 \ominus \not\equiv \supset \vdash, \circ \sqsubset \ddot{\sim} (\sqsubset \text{'}\%\text{u'} \text{'}\%\text{f'} \text{'}\%\text{u'}), (\sqsubset \text{'}\%\text{u'} \text{'}\%\text{i'}, \vdash), (\sqsubset (\sqsubset \text{'}\%\text{u'}), \vdash)) \ddot{} \circ v$

$lt \leftarrow (\sqsubset \theta), \ddot{\sim} \vdash$

$val \leftarrow (n \iota \circ \cup n), \ddot{} \vdash (\vdash + (\not\equiv \dashv) \times 0 = \vdash) (\lceil / (\iota \not\equiv) \times \ddot{o}1 (\cup n)\; \circ .((\sqsubset \dashv) \in \vdash) (n2f \ddot{} \; v))$

$vag \leftarrow \land \circ \sim \circ (\circ .= \ddot{\sim} \circ \iota \not\equiv) \ddot{\sim} (\circ .(((1 \square \vdash) > 0 \square \dashv) \land (0 \square \vdash) < 1 \square \dashv) \ddot{\sim} val)$

$vae \leftarrow (\cup n) (\dashv, \ddot{o}0 \dashv (\square \ddot{\sim} \ddot{o}1\; 0) \circ \supset ((\vdash, \circ \supset (\iota \circ \not\equiv \dashv) \sim \vdash (\neq \ddot{\sim}) (\not\equiv \vdash) \uparrow \dashv) / \circ \oplus (\sqsubset \theta), \circ \downarrow \vdash))\; vag$

$vac \leftarrow (((0 \square \circ \varnothing \dashv) \iota \circ \sqsubset \vdash) \supset (1 \square \circ \varnothing \dashv), \circ \sqsubset \vdash)\; ndo$

$va \leftarrow ((\supset \overline{\sigma} /) (1 \uparrow \vdash), (((vae\; E_s) (d, t, k, (\dashv vac\; n), r, s, g, y, \circ \overline{\sigma} \ddot{\sim} (\sqsubset \dashv)\; vac \ddot{}\; v) \vdash) \ddot{}\; 1 \downarrow \vdash))\; scp$

$avb \leftarrow \{(((, \ddot{} \boldsymbol{\alpha \omega'}) \uparrow \ddot{\sim} 1 \downarrow \rho) \overline{\sigma} \vdash)\; \alpha\; \square \ddot{\sim} \ddot{o}2\; 0 \vdash \alpha \alpha \iota \alpha \alpha \cap \ddot{\sim} (\downarrow (\oplus 1 + \circ \iota\; 0 \iota \ddot{\sim} \vdash) ((\not\equiv \vdash) \uparrow \uparrow) \ddot{o}0\; 1 \vdash) \supset r\; \omega\}$

$avi \leftarrow {}^-1\; 0 + (\rho \dashv) \top (, \dashv) \iota (\sqsubset \vdash)$

$avh \leftarrow \{\sqsubset \omega, (n \omega) ((\alpha \alpha (\omega \omega\; avb)\; \omega) \{\alpha \alpha\; avi\; ndo\; (\sqsubset \alpha), \omega\}) \ddot{}\; v\; \omega\}$

$av \leftarrow (\supset \overline{\sigma} /) (+ \backslash F_m) \{\alpha ((\alpha ((\cup \circ \oplus (0 \rho \sqsubset '')), n)\; E_s) \square\; \omega)\; avh\; (r (1 \uparrow \omega) \overline{\sigma} \; F_s\; \omega)) \square\; \omega\} \vdash$

$rlf \leftarrow (\oplus \downarrow (((1 \supset \dashv) \cup \vdash \sim 0 \square \dashv) / \circ \oplus (\sqsubset \theta), \uparrow) \ddot{o}0\; 1 \ddot{\sim} 1 + \circ \iota \not\equiv) (\ominus 1 \ominus n, \ddot{o}0 (\sqsubset \dashv)\; veo \ddot{}\; v)$

$rl \leftarrow \vdash, \circ (\supset, /) (\sqsubset \circ n\; O_s \; \overline{\sigma}\; F_s)\; rlf \ddot{}\; scp$

$vc \leftarrow (\supset \overline{\sigma} /) (((1 \downarrow \vdash) \overline{\sigma} \ddot{\sim} (1\; 7 \uparrow \vdash), (\not\equiv \circ \cup \circ n\; E_s), 1\; {}^-3 \uparrow \vdash) \ddot{}\; scp)$

$eff \leftarrow (\supset \overline{\sigma} /) \vdash (((\sqsubset \circ \varnothing \circ \overline{\sigma}\; d, \text{'Fe'}, 3 \downarrow,)\; 1 \uparrow \dashv), 1 \downarrow \vdash) (d = \circ \supset d) \sqsubset_{[0]} \vdash$

$ef \leftarrow (F_m \land {}^-1 = \circ \times \circ \supset \ddot{}\; y) ((\supset \overline{\sigma} /) (\sqsubset \vdash (\neq \ddot{\sim}) \circ \sim (\lor \backslash \dashv)), (eff \ddot{}\; \sqsubset_{[0]})) \vdash$

$ifn \leftarrow 1 \text{'F'}\; 0 \text{'Init'}\; \theta\; 0\; 1, (4 \rho\; 0)\; \theta\; \theta, \ddot{\sim} \vdash$

$if \leftarrow (1 \uparrow \vdash) \overline{\sigma} (\vdash (\neq \ddot{\sim})\; O_m \land 1 = d) \overline{\sigma} ((\vdash wrap \ddot{\sim} \circ ifn \circ \not\equiv \circ \cup n) \vdash (\neq \ddot{\sim})\; E_m \land 1 = d) \overline{\sigma} (\lor \backslash F_m) (\neq \circ \vdash) \vdash$

$fgz \leftarrow (1 \uparrow \vdash) \overline{\sigma} ((({}^-1 + d), 1 \downarrow \ddot{o}1 \vdash)\; 1 \downarrow \vdash) \overline{\sigma} 2, \text{'G'}, 1, 3 \downarrow \ddot{o}1 ({}^-1 \uparrow {}^-1 \downarrow \ddot{o}1 \vdash), \circ n\; 1 \uparrow \vdash$

$fg \leftarrow (\supset \overline{\sigma} /) (fgz \ddot{}\; at\; (G_m \circ (\supset \overline{\sigma} /)\; 1 \uparrow \ddot{}\; \vdash) \vdash \sqsubset_{[0]} \ddot{\sim}\; d = 2 \lfloor g)$

$fft \leftarrow (, 1 \uparrow \vdash) (1 \text{'Z'}, (2 \downarrow {}^-5 \downarrow \dashv), (v \dashv), n, y, (\sqsubset 2 \uparrow \circ, \circ \supset \circ \supset e), l) ({}^-1 \uparrow E_s)$

$ff \leftarrow ((\supset \overline{\sigma} /) (1 \uparrow \vdash), (((1 \uparrow \vdash) \overline{\sigma} ((({}^-1 + d), 1 \downarrow \ddot{o}1 \vdash)\; 1 \downarrow \vdash) \overline{\sigma}\; fft) \ddot{}\; 1 \downarrow \vdash))\; scp$

$fzh \leftarrow ((\cup n) \cap (\supset \circ l \dashv)) ({}^-1 \oplus (\sqsubset \dashv), ((\not\equiv \vdash) - 1 + (\oplus n) \iota \dashv) ((\sqsubset \dashv \supset \ddot{} \circ \sqsubset (\supset \ddot{} e)), (\sqsubset \dashv \supset \ddot{} \circ \sqsubset (\supset \ddot{} y)), \circ \sqsubset \dashv) \vdash) \vdash$

$fzf \leftarrow 0 \neq (\not\equiv \circ \rho \ddot{} \circ \supset \circ v \dashv)$

$fzb \leftarrow (((\supset \circ v \dashv) (\neq \ddot{\sim})\; fzf), n), \circ \overline{\sigma} (\text{'f'} \circ, \circ \overline{\Phi} \ddot{} \circ \iota (+/fzf)), (\text{'s'} \circ, \circ \overline{\Phi} \ddot{} \circ \iota \circ \not\equiv \vdash)$

$fzv \leftarrow ((\sqsubset \dashv) (\ominus \uparrow) \ddot{\sim} \ddot{} (\not\equiv \dashv) (- + \circ \iota \vdash) (\not\equiv \vdash)) ((\vdash, \ddot{\sim} 1 \square \circ \varnothing \dashv) \square \ddot{\sim} (0 \square \circ \varnothing \dashv) \iota \vdash) \ddot{o}2\; 0 \ddot{}\; v$

$fze \leftarrow ({}^-1 + d), t, k, fzb ((\vdash / (- \circ \not\equiv \vdash) \uparrow \dashv), r, s, g, fzv, y, e, \circ \overline{\sigma}\; l) \vdash$

$fzs \leftarrow (, 1 \uparrow \vdash) (1 \ominus (\dashv ((1 \text{'Y'}, (2 \square \dashv), \vdash) \overline{\sigma} \circ \varnothing \circ \overline{\sigma} (3 \uparrow \dashv), \vdash)\; 1 \oplus fzh, {}^-1 \downarrow 6 \downarrow \dashv) \overline{\sigma}\; fze) (\neq \circ \vdash)$

$fz \leftarrow ((\supset \overline{\sigma} /) (1 \uparrow \vdash), (((2 = d) (fzs \; \overline{\sigma} (1 \downarrow \circ \sim \dashv) (\neq \circ \vdash)\; 1 \downarrow \vdash) \vdash) \ddot{}\; 1 \downarrow \vdash)) (1, 1 \downarrow S_m) \sqsubset_{[0]} \vdash$

$fd \leftarrow (1 \uparrow \vdash) \overline{\sigma} ((1, \text{'Fd'}, 3 \downarrow \vdash) \ddot{o}1\; F_s) \overline{\sigma}\; 1 \downarrow \vdash$

$tta \leftarrow (fc \circ da \circ (pc \star \equiv) \circ mr \star \equiv) \circ in \star 3 \circ sd \circ ljo \circ ca \circ fe \circ lgo \circ n mr \circ o m r \circ dn \circ l f \circ du \circ d f \circ r d \circ r n$

$tt \leftarrow fd \circ fz \circ ff \circ fg \circ if \circ ef \circ vc \circ rl \circ av \circ va \circ lt \circ nv \circ fv \circ ll \circ ce \circ ur \circ tta$

$E_1 \leftarrow \{\text{'fn'}\, gcl\, ((\subset n\, ,\circ\supset v), e, y)\, \omega\}$

$E_2 \leftarrow \{\text{'fn'}\, gcl\, ((\subset n\, ,\circ\supset v), e, y)\, \omega\}$

$E_i \leftarrow \{r\, l\, f \leftarrow \supset v\, \omega \diamond ((\supset n\, \omega)\, (\text{'fn'}\, var)\, \supset\supset e\, \omega), \text{'='}, ((\supset\supset v\, \omega)\, (\text{'fn'}\, var)\, 1 \supset \supset e\, \omega), \text{';'}, nl\}$

$O_1 \leftarrow \{\text{'op'}\, gcl\, ((\subset n\, ,\circ\supset v), e, y)\, \omega\}$

$O_2 \leftarrow \{\text{'op'}\, gcl\, ((\subset n\, ,\circ\supset v), e, y)\, \omega\}$

$O_0 \leftarrow \{\text{''}\}$

$O_f \leftarrow \{\text{'EF('}, (\text{'}\Delta\text{'}\square R\text{'}\_\_\text{'} \supset n\, \omega), \text{','}, (\supset\supset v\, \omega), \text{');'}, nl\}$

$F_d \leftarrow \{\text{'FP('}, (\supset n\, \omega), \text{');'}, nl\}$

$F_0 \leftarrow \{\text{'DF('}, (\supset n\, \omega), \text{'\_f){'}, nl, \text{'A*env[]={tenv};'}, nl\}$

$F_1 \leftarrow \{\text{'DF('}, (\supset n\, \omega), \text{'\_f){'}, nl, (\text{'env0'}\, dnv\, \omega), (fnv\, \omega)\}$

$G_0 \leftarrow \{v \leftarrow (\supset\supset v\, \omega)\, (\text{''}\, var)\, 1 \supset \supset e\, \omega$

$\qquad \text{'if(1!=cnt('}, v, \text{'))err(5);if('}, v, \text{'.v.as(s32).scalar<I>()){'}, nl\}$

$G_1 \leftarrow \{\text{'z='}, ((\supset n\, \omega)\, (\text{''}\, var)\, \supset\supset e\, \omega), \text{';goto L'}, (\overline{\Phi}\supset l\, \omega), \text{';}'\}', nl\}$

$L_0 \leftarrow \{\text{'z='}, a, \text{';L'}, (\overline{\Phi}\supset n\, \omega), \text{':'}, (a \leftarrow (1 \supset \supset v\, \omega)\, (\text{''}\, var)\, 1 \supset \supset e\, \omega), \text{'=z;'}, nl\}$

$Z_0 \leftarrow \{\text{'}'\}', nl, nl\}$

$Z_1 \leftarrow \{\text{'}'\}', nl, nl\}$

$Z_e \leftarrow \{\text{'}'\}', nl, nl\}$

$M_0 \leftarrow \{rth, (\text{'tenv'}\, dnv\, \omega), nl, \text{'A*env[]={'}, ((0 \equiv \supset\omega) \supset \text{'tenv'}\, \text{'NULL'}), \text{'};'}, nl, nl\}$

$S_0 \leftarrow \{((\text{'{'}, rk0, srk, \text{'DO(i,prk)cnt*=sp[i];'}, spp, sfv, slp)\, \omega)\}$

$Y_0 \leftarrow \{\supset,/ ((\iota \not\equiv \supset n\, \omega)\, ((\dashv sts\ddot{}\,(\supset l), \ddot{}\,\circ\supset s), \text{'}'\}', nl, \dashv ste\ddot{}\,(\supset n)\, var\ddot{}\,\circ\supset r)\, \omega), \text{'}'\}', nl\}$

$gc \leftarrow \{\supset,/ \{0 = \supset t\, \omega : \subset 5 \rho\, \theta \diamond \subset (\underline{\Phi}\,(\supset t\, \omega), \overline{\Phi}\supset k\, \omega)\, \omega\}\ddot{o}1 \vdash \omega\}$

$syms \leftarrow , \ddot{}$	'+'	'-'	'×'	'÷'	'*'	'⊛'	'|'	'o'	'⌊'	'⌈'	'!'
$nams \leftarrow$	'add'	'sub'	'mul'	'div'	'exp'	'log'	'res'	'cir'	'min'	'max'	'fac'
$syms , \leftarrow , \ddot{}$	'<'	'≤'	'='	'≥'	'>'	'≠'	'~'	'∧'	'∨'	'⍲'	'⍱'
$nams , \leftarrow$	'lth'	'lte'	'eql'	'gte'	'gth'	'neq'	'not'	'and'	'lor'	'nan'	'nor'
$syms , \leftarrow , \ddot{}$	'⍳'	'⌷'	'⍳'	'ρ'	','	'⍪'	'φ'	'⍀'	'⊖'	'∊'	'⊃'
$nams , \leftarrow$	'sqd'	'brk'	'iot'	'rho'	'cat'	'ctf'	'rot'	'trn'	'rtf'	'mem'	'dis'
$syms , \leftarrow , \ddot{}$	'≡'	'≢'	'⊢'	'⊣'	'⊤'	'⊥'	'/'	'⌿'	'\\'	'⍀'	'?'
$nams , \leftarrow$	'eqv'	'nqv'	'rgt'	'lft'	'enc'	'dec'	'red'	'rdf'	'scn'	'scf'	'rol'
$syms , \leftarrow , \ddot{}$	'↑'	'↓'	'⍤'	'⍨'	'.'	'⍥'	'⍠'	'o'	'u'	'n'	
$nams , \leftarrow$	'tke'	'drp'	'map'	'com'	'dot'	'rnk'	'pow'	'jot'	'unq'	'int'	
$syms , \leftarrow , \ddot{}$	'⍋'	'⍒'	'∘.'	'⍷'	'⊂'	'⌺'	'⎕FFT'	'⎕IFFT'	'%u'		
$nams , \leftarrow$	'gdu'	'gdd'	'oup'	'fnd'	'par'	'mdv'	'fft'	'ift'	''		

$nl \leftarrow \square UCS\, 13\, 10 \diamond fvs \leftarrow ,\ddot{o}0\, (\not=\ddot{\approx})\, 0 \neq (\not\equiv\circ\rho^{\ddot{}}\,\dashv) \diamond cln \leftarrow \text{'-'}\, \square R\, \text{'-'} \diamond cnm \leftarrow (syms\, \iota \subset) \supset (nams, \subset)$

$lits \leftarrow \{\text{'A(0,eshp,constant('}, (cln\, \overline{\Phi}\, \omega), \text{',eshp,'}, (\text{'f64'}\,\text{'s32'}\, \supset\ddot{\approx}\, \omega = \lfloor\omega), \text{'))'}\}$

$litv \leftarrow \{\text{'std::vector<'}, (\text{'DI'}\, \supset\ddot{\approx}\, \wedge/\, \omega = \lfloor\omega), \text{'>{'}, (cln \supset \{\alpha, \text{','}, \omega\}/\, \overline{\Phi}\ddot{}\, \omega), \text{'}.data()'}\}$

$lita \leftarrow \{\text{'A(1,dim4('}, (\overline{\Phi}\not\equiv\omega), \text{'),array('}, (\overline{\Phi}\not\equiv\omega), \text{','}, (litv\, \omega), \text{'))'}\}$

$lit \leftarrow \{\text{' '} = \supset 0 \rho\, \omega : (cnm\, \omega), \alpha \diamond 1 = \not\equiv\omega : lits\, \omega \diamond lita\, \omega\}$

$var \leftarrow \{\alpha \equiv \text{,'}\alpha\text{'}: \text{,'}\iota\text{'} \diamond \alpha \equiv \text{,'}\omega\text{'}: \text{,'}r\text{'} \diamond \text{'}1 \geq \supset\omega : \alpha\alpha\, lit, \alpha \diamond \text{'env['}, (\overline{\Phi}\supset\omega), \text{']['}, (\overline{\Phi}\supset \Phi\omega), \text{']'}\}$

$dnv \leftarrow \{(0 \equiv z) \supset (\text{'A '}, \alpha, \text{'['}, (\overline{\Phi}\, z \leftarrow \supset v\, \omega), \text{'];'}) (\text{'A*'}, \alpha, \text{'=NULL;'})\}$

$fnv \leftarrow \{z \leftarrow \text{'A*env['}, (\overline{\Phi}\, 1 + \supset s\, \omega), \text{']={'}, (\supset,/ (\subset\text{'env0'}), \{\text{',p['}, (\overline{\Phi}\omega), \text{']'}\}\ddot{}\,\iota\supset s\, \omega), \text{'};'}, nl\}$

$gcl \leftarrow \{z\, r\, l\, n \leftarrow ((3 \rho \subset\text{'fn'}), \subset\alpha)\, \{\supset \alpha\, var/\, \omega\}\ddot{}\,\downarrow(\supset\omega), \ddot{;}\,1 \supset \omega \diamond n, \text{'('}, (\supset\{\alpha, \text{','}, \omega\}/\, z\, l\, r \sim \subset\text{'fn'}), \text{',env);'}, nl\}$

```apl
∇Z ← GfxΔInit S
  'w_new'    ⎕NA 'P ',(BSO S),'|w_new <C[]'
  'w_close' ⎕NA 'I ',(BSO S),'|w_close P'
  'w_del'    ⎕NA (BSO S),'|w_del P'
  'w_img'    ⎕NA (BSO S),'|w_img <PP P'
  'w_plot'  ⎕NA (BSO S),'|w_plot <PP P'
  'w_hist'  ⎕NA (BSO S),'|w_hist <PP F8 F8 P'
  'loadimg' ⎕NA (BSO S),'|loadimg >PP <C[] I'
  'saveimg' ⎕NA (BSO S),'|saveimg <PP <C[]'
  Z ← 0 0 ρ θ
∇
```

$Display \leftarrow \{\alpha \leftarrow \text{'Co-dfns'} \diamond W \leftarrow w\_new \subset \alpha \diamond 777 :: w\_del\ W$
$\qquad\qquad w\_del\ W \dashv W\ \alpha\alpha\{w\_close\ \alpha : \text{⍕}\text{'}\ \!⎕SIGNAL\ 777\text{'} \diamond \alpha\ \alpha\alpha\ \omega\}⍣\omega\omega \vdash \omega\}$
$LoadImage \leftarrow \{\alpha \leftarrow 1 \diamond \text{⍉}\ loadimg\ \theta\ \omega\ \alpha\}$
$SaveImage \leftarrow \{\alpha \leftarrow \text{'image.png'} \diamond saveimg\ (\text{⍉}\omega)\ \alpha\}$
$\quad Image \leftarrow \{\sim 2\ 3\ \vee.= \not\equiv\rho\omega : ⎕SIGNAL\ 4 \diamond (3 \neq 2 \supset 3 \uparrow \rho\omega) \wedge 3 = \not\equiv\rho\omega : ⎕SIGNAL\ 5 \diamond \omega \dashv w\_img\ (\text{⍉}\omega)\ \alpha\}$
$\qquad Plot \leftarrow \{2 \neq \not\equiv\rho\omega : ⎕SIGNAL\ 4 \diamond \sim 2\ 3\ \vee.= 1 \supset \rho\omega : ⎕SIGNAL\ 5 \diamond \omega \dashv w\_plot\ (\text{⍉}\omega)\ \alpha\}$
$Histogram \leftarrow \{\omega \dashv w\_hist\ \omega, \alpha\}$

:EndNamespace