Network programs in BASIC (Kipper BASIC/BASIC on Bails)

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some background

- ✔ ip65 is a TCP/IP stack for the Commodore 64, created by Per Olofsen ("MagerValp") and currently maintained by Jonno Downes
- ✔ Jonno wrote netboot65, which provides cartridge images that include tftp, gopher and telnet clients, as well as network booting
- ✔ geoLink (IRC client for GEOS) also based on ip65

why aren't there more programs?

- ✔ there are several networking libraries available for RR-Net compatible network cards, but...
- ✔ network coding in ML is notoriously tedious and error prone; the number of people willing and able to spend the time on this is small
- ✔ there have not been high level language bindings for C= network stacks...

but now...

- ✔ Jonno has just created two different runtimes which provide BASIC language bindings for the ip65 network stack
- ✔ the runtimes work like any other BASIC extension, and provide additional keywords for writing networked programs
- ✔ extremely easy to use, good for prototyping as well as complete applications

why two runtimes?

- ✔ memory constraints - not all functionality would fit in a single runtime
- ✔ Kipper BASIC is for general networking (socket programming, TFTP, netcat, &c.)
- ✔ BASIC on Bails is for writing web apps ('64 acts as a server)
- ✔ both have the ability to autoload a program after initialization (see STARTUP in docs)

Keywords used by both runtimes

- ✔ MAC (set low bytes of MAC address)
- ✔ MYIP, NETMASK, GATEWAY, DNS
  (for manually setting network parameters)
- ✔ DHCP (auto configure network settings)
- ✔ IPCFG (show network settings)
- ✔ PING

Kipper BASIC keywords

- ✔ TCPCONNECT (open TCP/IP connection)
- ✔ TCPLISTEN (open server socket and block)
- ✔ POLL (poll network for received packets)
- ✔ TCPSEND (send data over network)
- ✔ TCPBLAT (send file over the network)
- ✔ TCPCLOSE (close connection)

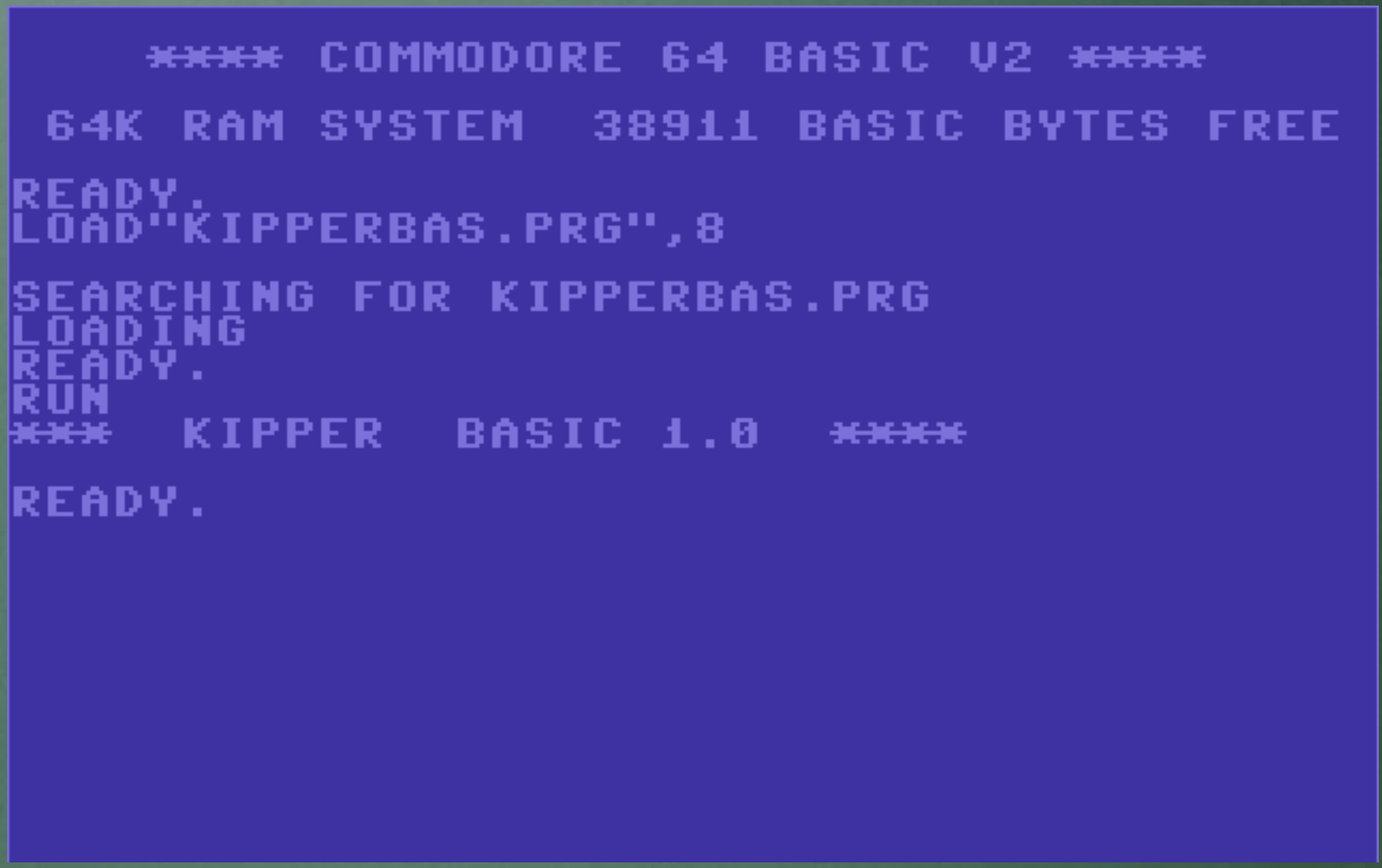
more Kipper BASIC keywords

- ✔ TFTP (set TFTP server for TFPUT, TFGET)
- ✔ TFGET/TFPUT (send/receive file via TFTP)
- ✔ NETCAT (echo keyboard input to network)

Kipper BASIC reserved variables

- ✔ IN$ - holds received data from polling (up to 255 bytes)
- ✔ CO% - 1 if connection is open, 0 otherwise (to detect dropped connection)
- ✔ ER% - last network error number (see documentation for details)

loading Kipper BASIC



example: remote shell client

```
REMOTE SHELL
CONFIGURING NETWORK WITH DHCP...
INTERFACE     : RR-NET
MAC ADDRESS   : 00:80:10:19:53:64
IP ADDRESS    : 192.168.1.100
NETMASK       : 255.255.255.0
GATEWAY       : 192.168.1.99
DNS SERVER    : 192.168.1.99
DHCP SERVER   : 192.168.1.99
TFTP SERVER   : 255.255.255.255
HOSTNAME OR IP? 192.168.1.101
PORT? 1953
CONNECTING TO 192.168.1.101/1953
CONNECTED
>$
DISK KB-20100822
  1    START KIPPERBAS  PRG
 40    KIPPERBAS.PRG    PRG
  3    GOPHERD          PRG
  5    RSHD             PRG
  1    GOPHERMAP.TXT    SEQ
  3    ADDRESSES.TXT    PRG
  5    RSH              PRG
593 BLOCKS FREE.
>
```

sample code (client)

```
10 PRINT"{CLR}REMOTE SHELL"
12 PRINT"CONFIGURING NETWORK WITH DHCP..
 "
14 DHCP
16 IPCFG
20 INPUT"HOSTNAME OR IP";HN$
22 IF LEN(HN$)<>0THEN30
24 PRINT"YOU MUST ENTER A HOSTNAME.":GOT
O20
30 INPUT"PORT";PN$
31 IF LEN(PN$)<>0THEN33
32 PRINT"YOU MUST ENTER A PORT NUMBER.":
GOTO30
33 NU=1
34 FOR I=1TOLEN(PN$)
35 C$=MID$(PN$,I,1)
36 IF C$<"0"ORC$>"9"THEN NU=0
37 NEXT
38 IF NU=0THENPRINT"PORT NUMBER MUST BE
NUMERIC.":GOTO30
40 PRINT"CONNECTING TO ";HN$;"/";PN$
42 TCPCONNECT HN$,VAL(PN$)

READY.
```

example: remote shell server

```
REMOTE SHELL SERVER
CONFIGURING NETWORK WITH DHCP...
INTERFACE     : RR-NET
MAC ADDRESS   : 00:80:10:19:53:65
IP ADDRESS    : 192.168.1.101
NETMASK       : 255.255.255.0
GATEWAY       : 192.168.1.99
DNS SERVER    : 192.168.1.99
DHCP SERVER   : 192.168.1.99
TFTP SERVER   : 255.255.255.255
LISTENING ON PORT 1953...
CONNECT!
'$'
'C0:RSH.BAK=RSH'
'S0:RSH.BAK'
DISCONNECTED!
LISTENING ON PORT 1953...
```

sample code (server)

```
10 PRINT"{CLR}REMOTE SHELL SERVER"
15 CL$=CHR$(13)+CHR$(10)
20 PRINT"CONFIGURING NETWORK WITH DHCP..
."
30 DHCP
40 IPCFG
50 PRINT"LISTENING ON PORT 1953..."
60 TCPLISTEN 1953
70 PRINT"CONNECT!"
80 POLL
90 IF CO%=0 THEN PRINT"DISCONNECTED!":GO
TO 50
95 GETG$:IFG$=""THEN100
96 IFG$="@"THENPRINT"CANCELED!":CLOSE1:T
CPCLOSE:END
100 IF LEN(IN$)=0 THEN 80
110 CM$=""
111 FOR I=1TOLEN(IN$)
112 C$=MID$(IN$,I,1)
113 IF ASC(C$)<=13 THENI=255:GOTO116
114 IF ASC(C$)>=97 AND ASC(C$)<=122 THEN
C$=CHR$(ASC(C$)AND 223)
BREAK
READY.
```

BASIC on Bails keywords (setup)

- ✔ HTTPD <port, default_line_no>

  (starts web server with default callback)

- ✔ HOOK <path, line_no>

  (specify callback for HTTP path, e.g. HOOK "/HELLO",1000)

  can also access path via reserved variable PA$

- ✔ TYPE <mime_type>

  (change MIME type)

- ✔ STATUS <http_status>

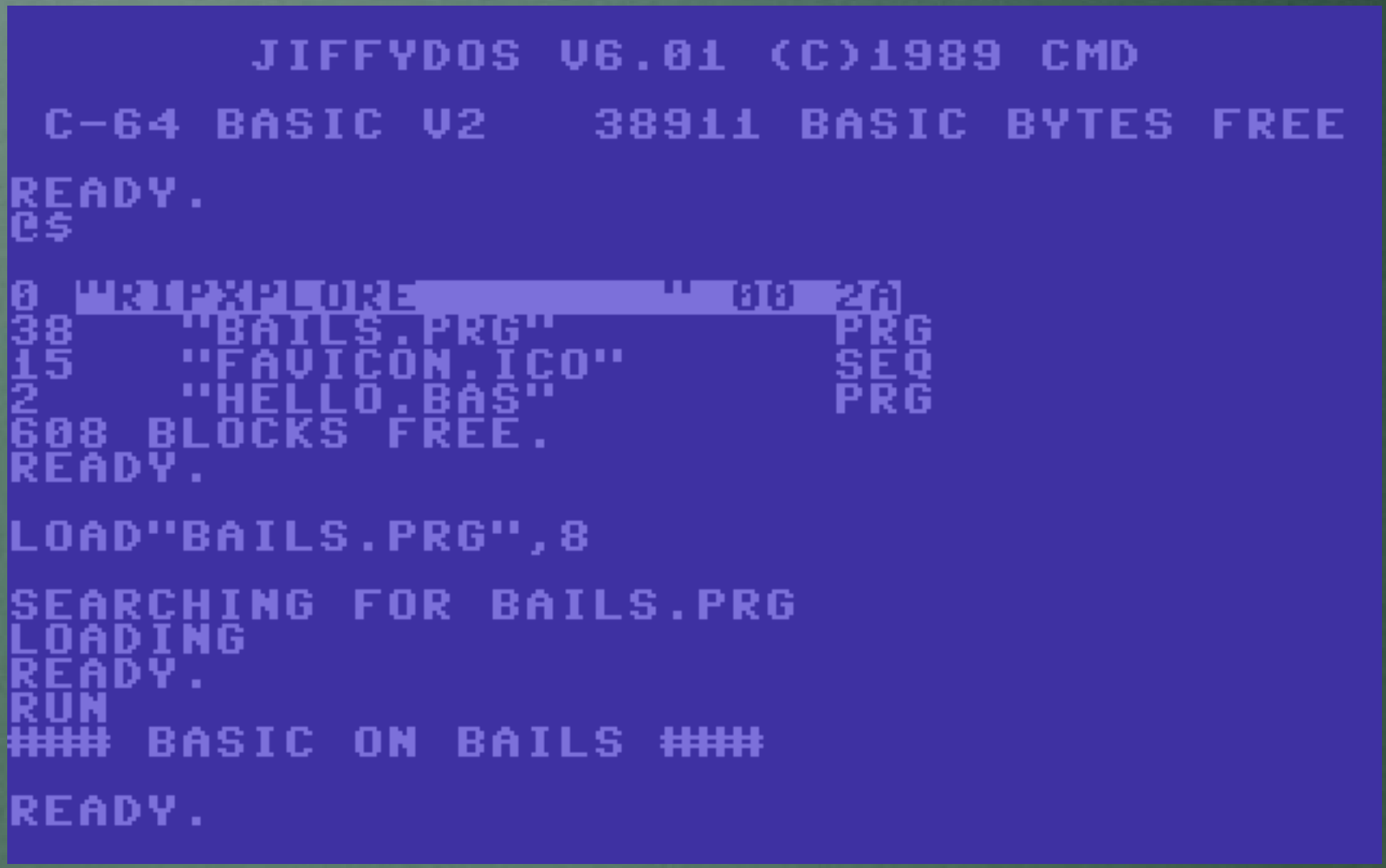
  (change HTTP status, e.g. "403 forbidden")

BASIC on Bails keywords (data)

- ✔ ! <output_string>
  (send output to client)
- ✔ XSEND <filename>
  (send file to client, e.g. "FAVICON.ICO")
- ✔ YIELD
  (complete HTTP response and wait for next callback)

Request parameters are translated to BASIC variables, but only the first letter is significant.

loading BASIC on Bails



web server output

```
listening on 192.168.1.101:80
connection from 192.168.1.200:33186
path: /
listening on 192.168.1.101:80
connection from 192.168.1.200:33187
path: /select
listening on 192.168.1.101:80
connection from 192.168.1.200:33188
path: /
listening on 192.168.1.101:80
```

BASIC on Bails, baby!

ECCC/VCFMW 2010 PRESENTATION SCHEDULE

(THIS SERVER IS RUNNING BASIC ON BAILS ON A COMMODORE 64!)

SELECT PRESENTATION TO VIEW DETAILS:

```
----- ALTAIR WORKSHOP
10:30 XUM1541
11:00 CBM-COMMAND
12:00 ATARI PROJECTS
13:30 KIPPER BASIC
14:00 CRIMSON TWILIGHT
14:30 STEREOINSID
```

SELECT

source code (startup)

```
10  dhcp
20  hook"/select",1000
21  nb$="&"+chr$(110)+chr$(98)+chr$(115)+
chr$(112)+";"
25  fa$="/"+chr$(102)+chr$(97)+chr$(118)+
chr$(105)+chr$(99)+chr$(111)
27  fa$=fa$+chr$(110)+chr$(46)+chr$(105)+
chr$(99)+chr$(111)
30  rem hookfa$,2000
40  httpd80,100
65  "
100 !"<html><body style=background-color
:#b0c4de;margin:24px>"
101 !"<div style=text-align:center;width
:320px>"
102 !"<h2>eccc/vcfmw 2010<br>presentatio
n schedule</h3>"
104 !"<p><b><i>(this server is running "

105 !"basic"+nb$+"on"+nb$+"bails on a co
mmodore 64!)</i></b>"
106 !"</div>"

ready.
```

source code (form)

```
130 !"<form name=sl action=select>"
140 !"<select name=p size=7 style=font-f
amily:monospace>
150 !"<option>----- altair workshop</opt
ion>"
160 !"<option>10:30 xum1541</option>"
170 !"<option>11:00 cbm-command</option>
"
180 !"<option>12:00 atari projects</opti
on>"
190 !"<option>13:30 kipper basic</option
>"
200 !"<option>14:00 crimson twilight</op
tion>"
210 !"<option>14:30 stereoinsid</option>
"
270 !"</select><br><br>"
280 !"<input type=submit value='select'>
"
290 !"</body></html>"
299 yield

ready.
```

source code (dispatch)

```
1000 !"<html><body style=background-colo
r:#b0c4de;margin:24px>"
1010  t$=left$(p$,5)
1020  if t$="------"thengosub1100
1030  if t$="10:30"thengosub1200
1040  if t$="11:00"thengosub1300
1050  if t$="12:00"thengosub1400
1060  if t$="13:30"thengosub1500
1070  if t$="14:00"thengosub1600
1080  if t$="14:30"thengosub1700
1096  !"</div>"
1097  !"<br><a href='/'>back</a>"
1098  !"</body></html>"
1099  yield
1100  !"<h3>altair workshop</h3>"
1110  !"<div style=width:320px>"
1120  !"vince briel will host one of his
all-day replica workshops, this time "
1130  !"building a recreation of the alta
ir 8800."
1199 return

ready.
```

implications

- ✔ now anyone can code network programs
- ✔ even if you are considering a larger project written in ML, it's good for prototyping
- ✔ IT'S FUN! When is the last time you had fun writing a program in Commodore BASIC?

resources

- ✔ not yet released, but can be checked out using Subversion
- ✔ repo contains a D64 image ready to go (no building necessary)

  `http://sourceforge.net/projects/netboot65/develop`

- ✔ I've also started a page on my site:

  `http://www.lyonlabs.org/commodore/kb-bob/index.html`