Lab2实验: Lending Your Name

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L版本程序设计

循环函数为 $F(n) = (F(n-1) + 2 * F(n-3)) \mod 1024 (1 <= n <= 16384)$ 其中 $mod 1024 \equiv mod 2^{10}$ 即为取寄存器16位的低10位作为数值 而溢出同样意味着取模,且不会对低位的正确性造成影响,则只需要对寄存器加法进行考虑即可。计算结束后只需要将结果与x03FF 取AND即可得到最终答案。

原始版本

算法直接选择打表,并将打表结果储存在开辟的空间中。

```
.ORIG x3000; start the program at location x3000
LD R4, NUMBER
LD R5, for AND
LEA R1,Data;R1存正在运算的n-3的地址
LDR R3,R1,#2
LOOP LDR R2,R1,#0
ADD R2,R2,R2
ADD R3,R3,R2
AND R3,R3,R5
STR R3,R1,#3
ADD R1,R1,#1
ADD R4,R4,#-1
BRp LOOP
LEA R2,Data;Data的地址
ADD R0,R0,R2;F(n)的地址
LDR R7,R0,#0
HALT
forAND .FILL x03FF
Num .FILL #99
NUMBER .FILL #16381
Data .FILL 1
.FILL 1
.FILL 2
.BLKW 16381 ;总计x4000
.FILL x03A2;F(20)
.FILL x0002;F(02)
.FILL x000A;F(05)
.FILL x0356;F(99)
.END
```

部分实验结果

从x3013起从F(0)开始存储实验结果,即在本例中,F(n)=mem[n+x3013]

● ► x3000 x2811 10257 LD R4,NUMBER ● ► x3001 x2A0E 10766 LD R5,forAND ● ► x3003 x6642 26178 LDR R3,R1,#2 ● ► x3004 x6440 25664 LOOP LDR R2,R1,#0 ● ► x3005 x1482 5250 ADD R2,R2,R2 ● ► x3006 x16c2 5826 ADD R3,R3,R2 ● ► x3007 x56c5 22213 AND R3,R3,R5 ● ► x3008 x7643 30275 STR R3,R1,#3 ● ► x3008 x1261 4705 ADD R1,R1,#1 ● ► x300B x0378 1016 EBR LOOP ● ► x300B x0378 1016 EBR LOOP ● ► x300C x8406 -7162 LEA R2,Data ● ► x300D x1002 4098 ADD R0,R0,R2 ● ► x300E x6E00 28160 LDR R7,R0,#0 ● ► x3011 x0063 99 Num .FILL x03FF ● ► x3012 x3FFD 16381 NUMEER .FILL #16381 ● ► x3013 x0001 1 Data .FILL 1 ● ► x3016 x004 4 .BLKW 16381	● ★3001 ×2A0E 10766 LD R5.forAND ● ★3002 ×E210 -7664 LEA R1.Data ● ★3003 ×6642 26178 LDR R3.R1.#2 ● ★3004 ×6440 25664 LOOP LDR R2.R1.#0 ● ★3005 ×1482 5250 ADD R2.R2.R2 ● ★3006 ×16c2 5826 ADD R3.R3.R2 ● ★3007 ×56c5 22213 AND R3.R3.R5 ● ★3008 ×7643 30275 SER R3.R1.#3 ● ★3009 ×1261 4705 ADD R1.R1.#1 ● ★3000 ×1261 4705 ADD R4.R4.#-1 ● ★300B ×03F8 1016 BRP LOOP ● ★300B ×03F8 1016 BRP LOOP ● ★300D ×1002 4098 ADD R0.R0.R2 ● ★300E ×6E00 28160 LDR R7.R0.#0 ● ★300F ×6E00 28160 LDR R7.R0.#0 ● ★3011 ×0663 99 Num FILL #99 ● ★3012 ×3FFD 16381 NUMBER .FILL #16381 ● ★3015 ×0004 4 .BLKW 16381 ● ★3018 </th <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>						
● ★3002 xE210 -7664 LEA RI,Data ● ★3003 x6642 26178 LDR R3,R1,#2 ● ★3004 x6440 25664 LOOP LDR R2,R1,#0 ● ★3005 x1482 5250 ADD R2,R2,R2 ● ★3006 x16c2 5826 ADD R3,R3,R2 ● ★3008 x7643 30275 STR R3,R1,#3 ● ★3009 x1261 4705 ADD R1,R1,#1 ● ★3000 x193F 6463 ADD R4,R4,#-1 ● ★300D x03F8 1016 BRP LOOP ● ★300C xE406 -7162 LEA R2,Data ● ★300D x1002 4098 ADD R0,R0,R2 ● ★300E x6E00 28160 LDR R7,R0,#0 ● ★301D x03FF 1023 forAND .FILL x03FF ● ★3011 x0063 99 Num .FILL #99 ● ★3012 x3FFD 16381 NUMBER .FILL #16381 ● ★3015 x0001 1 Data .FILL 1 ● ★3015 x0004 4 BLKW 16381 ● ★3018 x0006 6 .BLKW 16381 ● ★3018 </th <th>● x3002 xE210 -7664 LEA R1,Data ● x3003 x6642 26178 LDR R3,R1,#2 ● x3004 x6440 25664 LOOP LDR R2,R1,#0 ● x3005 x1482 5250 ADD R2,R2,R2 ● x3006 x16c2 5826 ADD R3,R3,R2 ● x3008 x7643 30275 STR R3,R1,#3 ● x3009 x1261 4705 ADD R1,R1,#1 ● x300B x03F8 1016 BRP LOOP ● x300D x03F8 1016 BRP LOOP ● x300D x1002 4098 ADD R0,R0,R2 ● x300E x6E00 28160 LDR R7,R0,#0 ● x301D x03FF 1023 forAND .FILL x03FF ● x3011 x0063 99 Num .FILL #99 ● x3012 x3FFD 16381 NUMBER .FILL #16381 ● x3013 x0001 1 Data .FILL 1 ● x3015 x0002 2 .FILL 2 ● x3016 x0004 4 .BLKW 16381 ● x3019 x0006 6 .BLKW 16381 ● x3019 <t< th=""><th>0</th><th> </th><th>x3000</th><th>x2811</th><th>10257</th><th>LD R4,NUMBER</th></t<></th>	● x3002 xE210 -7664 LEA R1,Data ● x3003 x6642 26178 LDR R3,R1,#2 ● x3004 x6440 25664 LOOP LDR R2,R1,#0 ● x3005 x1482 5250 ADD R2,R2,R2 ● x3006 x16c2 5826 ADD R3,R3,R2 ● x3008 x7643 30275 STR R3,R1,#3 ● x3009 x1261 4705 ADD R1,R1,#1 ● x300B x03F8 1016 BRP LOOP ● x300D x03F8 1016 BRP LOOP ● x300D x1002 4098 ADD R0,R0,R2 ● x300E x6E00 28160 LDR R7,R0,#0 ● x301D x03FF 1023 forAND .FILL x03FF ● x3011 x0063 99 Num .FILL #99 ● x3012 x3FFD 16381 NUMBER .FILL #16381 ● x3013 x0001 1 Data .FILL 1 ● x3015 x0002 2 .FILL 2 ● x3016 x0004 4 .BLKW 16381 ● x3019 x0006 6 .BLKW 16381 ● x3019 <t< th=""><th>0</th><th> </th><th>x3000</th><th>x2811</th><th>10257</th><th>LD R4,NUMBER</th></t<>	0	 	x 3000	x2811	10257	LD R4,NUMBER
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● ▶ x3007 x56C5 22213 AND R3,R3,R5 ● ▶ x3008 x7643 30275 STR R3,R1,#3 ● ▶ x3009 x1261 4705 ADD R1,R1,#1 ● ▶ x300A x193F 6463 ADD R4,R4,#-1 ● ▶ x300B x03F8 1016 BRP LOOP ● ▶ x300C xE406 -7162 LEA R2,Data ● ▶ x300D x1002 4098 ADD R0,R0,R2 ● ▶ x300E x6E00 28160 LDR R7,R0,#0 ● ▶ x300F xF025 -4059 HALT ● ▶ x3011 x0063 99 Num FILL #99 ● ▶ x3011 x0063 99 Num FILL #99 ● ▶ x3012 x3FFD 16381 NUMBER .FILL #16381 ● ▶ x3013 x0001 1 Data .FILL 1 ● ▶ x3014 x0001 1 .FILL 2 ● ▶ x3016 x0004 4 .BLKW 16381 ● ▶ x3018 x000A 10 .BLKW 16381 ● ▶ x301B x001E 30 .BLKW 16381	● ▶ x3007 x56C5 22213 AND R3,R3,R5 ● ▶ x3008 x7643 30275 STR R3,R1,#3 ● ▶ x3009 x1261 4705 ADD R1,R1,#1 ● ▶ x300A x193F 6463 ADD R4,R4,#-1 ● ▶ x300B x03F8 1016 BRP LOOP ● ▶ x300C xE406 -7162 LEA R2,Data ● ▶ x300D x1002 4098 ADD R0,R0,R2 ● ▶ x300E x6E00 28160 LDR R7,R0,#0 ● ▶ x300F xF025 -4059 HALT ● ▶ x3011 x0063 99 Num FILL #99 ● ▶ x3011 x0063 99 Num FILL #99 ● ▶ x3012 x3FFD 16381 NUMBER .FILL #16381 ● ▶ x3013 x0001 1 Data .FILL 1 ● ▶ x3014 x0001 1 .FILL 2 ● ▶ x3015 x0002 2 .FILL 2 ● ▶ x3016 x0004 4 .BLKW 16381 ● ▶ x3018 x000A 10 .BLKW 16381 ● ▶ x301A x001E 30 .BLKW 16381	0	 	x3005	x1482	5250	ADD R2,R2,R2
● ▶ x3008 x7643 30275 STR R3,R1,#3 ● ▶ x3009 x1261 4705 ADD R1,R1,#1 ● ▶ x300A x193F 6463 ADD R4,R4,#-1 ● ▶ x300B x03F8 1016 BRP LOOP ● ▶ x300C xE406 -7162 LEA R2,Data ● ▶ x300D x1002 4098 ADD R0,R0,R2 ● ▶ x300E x6E00 28160 LDR R7,R0,#0 ● ▶ x301D x03FF 1023 forAND .FILL x03FF ● ▶ x3011 x0063 99 Num .FILL #99 ● ▶ x3012 x3FFD 16381 NUMBER .FILL #16381 ● ▶ x3013 x0001 1 Data .FILL 1 ● ▶ x3014 x0001 1 .FILL 1 ● ▶ x3015 x0002 2 .FILL 2 ● ▶ x3016 x0004 4 .BLKW 16381 ● ▶ x3018 x000A 10 .BLKW 16381 ● ▶ x301A x001E 30 .BLKW 16381	● ▶ x3008 x7643 30275 STR R3,R1,#3 ● ▶ x3009 x1261 4705 ADD R1,R1,#1 ● ▶ x300A x193F 6463 ADD R4,R4,#-1 ● ▶ x300B x03F8 1016 ERP LOOP ● ▶ x300C xE406 -7162 LEA R2,Data ● ▶ x300D x1002 4098 ADD R0,R0,R2 ● ▶ x300E x6E00 28160 LDR R7,R0,#0 ● ▶ x300F xF025 -4059 HALT ● ▶ x3010 x03FF 1023 forAND .FILL x03FF ● ▶ x3011 x0063 99 Num .FILL #99 ● ▶ x3012 x3FFD 16381 NUMBER .FILL #16381 ● ▶ x3013 x0001 1 Data .FILL 1 ● ▶ x3014 x0001 1 .FILL 1 ● ▶ x3015 x0002 2 .FILL 2 ● ▶ x3016 x0004 4 .BLKW 16381 ● ▶ x3019 x0012 18 .BLKW 16381 ● ▶ x301A x001E 30 .BLKW 16381	0		x3006	x16C2	5826	ADD R3,R3,R2
● ▶ x3009 x1261 4705 ADD R1,R1,#1 ● ▶ x300A x193F 6463 ADD R4,R4,#-1 ● ▶ x300B x03F8 1016 BRp LOOP ● ▶ x300C xE406 -7162 LEA R2,Data ● ▶ x300D x1002 4098 ADD R0,R0,R2 ● ▶ x300E x6E00 28160 LDR R7,R0,#0 ● ▶ x3010 x03FF 1023 forAND .FILL x03FF ● ▶ x3011 x0063 99 Num .FILL #99 ● ▶ x3012 x3FFD 16381 NUMBER .FILL #16381 ● ▶ x3013 x0001 1 Data .FILL 1 ● ▶ x3014 x0001 1 .FILL 2 ● ▶ x3015 x0002 2 .FILL 2 ● ▶ x3016 x0004 4 .BLKW 16381 ● ▶ x3018 x000A 10 .BLKW 16381 ● ▶ x3019 x0012 18 .BLKW 16381 ● ▶ x301A x001E 30 .BLKW 16381	● ▶ x3009 x1261 4705 ADD R1,R1,#1 ● ▶ x300A x193F 6463 ADD R4,R4,#-1 ● ▶ x300B x03F8 1016 BRp LOOP ● ▶ x300C xE406 -7162 LEA R2,Data ● ▶ x300D x1002 4098 ADD R0,R0,R2 ● ▶ x300E x6E00 28160 LDR R7,R0,#0 ● ▶ x3010 x03FF 1023 forAND .FILL x03FF ● ▶ x3011 x0063 99 Num .FILL #99 ● ▶ x3012 x3FFD 16381 NUMBER .FILL #16381 ● ▶ x3013 x0001 1 Data .FILL 1 ● ▶ x3014 x0001 1 .FILL 2 ● ▶ x3015 x0002 2 .FILL 2 ● ▶ x3016 x0004 4 .BLKW 16381 ● ▶ x3018 x000A 10 .BLKW 16381 ● ▶ x3019 x0012 18 .BLKW 16381 ● ▶ x301A x001E 30 .BLKW 16381	0	>	x3007	x56C5	22213	AND R3,R3,R5
● ▶ x300A x193F 6463 ADD R4,R4,#-1 ● ▶ x300B x03F8 1016 BRP LOOP ● ▶ x300C xE406 -7162 LEA R2,Data ● ▶ x300D x1002 4098 ADD R0,R0,R2 ● ▶ x300E x6E00 28160 LDR R7,R0,#0 ● ▶ x301F xF025 -4059 HALT ● ▶ x3010 x03FF 1023 forAND .FILL x03FF ● ▶ x3011 x0063 99 Num .FILL #99 ● ▶ x3012 x3FFD 16381 NUMBER .FILL #16381 ● ▶ x3013 x0001 1 Data .FILL 1 ● ▶ x3014 x0001 1 .FILL 1 ● ▶ x3015 x0002 2 .FILL 2 ● ▶ x3016 x0004 4 .BLKW 16381 ● ▶ x3018 x000A 10 .BLKW 16381 ● ▶ x3019 x0012 18 .BLKW 16381 ● ▶ x301A x001E 30 .BLKW 16381	● ★ x300A x193F 6463 ADD R4,R4,#-1 ● ★ x300B x03F8 1016 BRp LOOP ● ★ x300C xE406 -7162 LEA R2,Data ● ★ x300D x1002 4098 ADD R0,R0,R2 ● ★ x300E x6E00 28160 LDR R7,R0,#0 ● ★ x301F xF025 -4059 HALT ● ★ x3011 x0063 99 Num .FILL x03FF ● ★ x3011 x0063 99 Num .FILL #99 ● ★ x3012 x3FFD 16381 NUMBER .FILL #16381 ● ★ x3013 x0001 1 Data .FILL 1 ● ★ x3014 x0001 1 .FILL 2 ● ★ x3015 x0002 2 .FILL 2 ● ★ x3016 x0004 4 .BLKW 16381 ● ★ x3018 x000A 10 .BLKW 16381 ● ★ x3019 x0012 18 .BLKW 16381 ● ★ x301A x001E 30 .BLKW 16381	0	>	x3008	x7643	30275	STR R3,R1,#3
● x300B x03F8 1016 BRp LOOP ● x300C xE406 -7162 LEA R2, Data ● x300D x1002 4098 ADD R0, R0, R2 ● x300E x6E00 28160 LDR R7, R0, #0 ● x300F xF025 -4059 HALT ● x3010 x03FF 1023 forAND .FILL x03FF ● x3011 x0063 99 Num .FILL #99 ● x3012 x3FFD 16381 NUMBER .FILL #16381 ● x3013 x0001 1 Data .FILL 1 ● x3014 x0001 1 .FILL 1 ● x3015 x0002 2 .FILL 2 ● x3016 x0004 4 .BLKW 16381 ● x3017 x0006 6 .BLKW 16381 ● x3018 x000A 10 .BLKW 16381 ● x3019 x0012 18 .BLKW 16381 ● x301A x001E 30 .BLKW 16381	● x300B x03F8 1016 ERp LOOP ● x300C xE406 -7162 LEA R2, Data ● x300D x1002 4098 ADD R0, R0, R2 ● x300E x6E00 28160 LDR R7, R0, #0 ● x300F xF025 -4059 HALT ● x3010 x03FF 1023 forAND .FILL x03FF ● x3011 x0063 99 Num .FILL #99 ● x3012 x3FFD 16381 NUMBER .FILL #16381 ● x3013 x0001 1 Data .FILL 1 ● x3014 x0001 1 .FILL 1 ● x3015 x0002 2 .FILL 2 ● x3016 x0004 4 .ELKW 16381 ● x3017 x0006 6 .ELKW 16381 ● x3018 x000A 10 .ELKW 16381 ● x3019 x0012 18 .ELKW 16381 ● x301A x001E 30 .BLKW 16381	0	 	x3009	x1261	4705	ADD R1,R1,#1
● x300C xE406 -7162 LEA R2,Data ● x300D x1002 4098 ADD R0,R0,R2 ● x300E x6E00 28160 LDR R7,R0,#0 ● x300F xF025 -4059 HALT ● x3010 x03FF 1023 forAND .FILL x03FF ● x3011 x0063 99 Num .FILL #99 ● x3012 x3FFD 16381 NUMBER .FILL #16381 ● x3013 x0001 1 Data .FILL 1 ● x3014 x0001 1 .FILL 1 ● x3015 x0002 2 .FILL 2 ● x3016 x0004 4 .BLKW 16381 ● x3017 x0006 6 .BLKW 16381 ● x3018 x000A 10 .BLKW 16381 ● x3019 x0012 18 .BLKW 16381 ● x301A x001E 30 .BLKW 16381	● x300C xE406 -7162 LEA R2,Data ● x300D x1002 4098 ADD R0,R0,R2 ● x300E x6E00 28160 LDR R7,R0,#0 ● x300F xF025 -4059 HALT ● x3010 x03FF 1023 forAND .FILL x03FF ● x3011 x0063 99 Num .FILL #99 ● x3012 x3FFD 16381 NUMBER .FILL #16381 ● x3013 x0001 1 Data .FILL 1 ● x3014 x0001 1 .FILL 1 ● x3015 x0002 2 .FILL 2 ● x3016 x0004 4 .BLKW 16381 ● x3017 x0006 6 .BLKW 16381 ● x3018 x000A 10 .BLKW 16381 ● x3019 x0012 18 .BLKW 16381 ● x301A x001E 30 .BLKW 16381	0	 	x300A	x193F	6463	ADD R4,R4,#-1
① ▶ x300D x1002 4098 ADD RO,RO,R2 ① ▶ x300E x6E00 28160 LDR R7,RO,#0 ② ▶ x300F xF025 -4059 HALT ③ ▶ x3010 x03FF 1023 forAND .FILL x03FF ④ ▶ x3011 x0063 99 Num .FILL #99 ④ ▶ x3012 x3FFD 16381 NUMBER .FILL #16381 ④ ▶ x3013 x0001 1 Data .FILL 1 ④ ▶ x3014 x0001 1 .FILL 1 ④ ▶ x3015 x0002 2 .FILL 2 ④ ▶ x3016 x0004 4 .BLKW 16381 ④ ▶ x3018 x000A 10 .BLKW 16381 ④ ▶ x3019 x0012 18 .BLKW 16381 ● ▶ x301A x001E 30 .BLKW 16381	① ▶ x300D x1002 4098 ADD RO,RO,R2 ① ▶ x300E x6E00 28160 LDR R7,RO,#0 ② ▶ x300F xF025 -4059 HALT ③ ▶ x3010 x03FF 1023 forAND .FILL x03FF ④ ▶ x3011 x0063 99 Num .FILL #99 ④ ▶ x3012 x3FFD 16381 NUMBER .FILL #16381 ④ ▶ x3013 x0001 1 Data .FILL 1 ④ ▶ x3014 x0001 1 .FILL 1 ④ ▶ x3015 x0002 2 .FILL 2 ④ ▶ x3016 x0004 4 .BLKW 16381 ④ ▶ x3018 x000A 10 .BLKW 16381 ④ ▶ x3019 x0012 18 .BLKW 16381 ● ▶ x301A x001E 30 .BLKW 16381	0	 	x300B	x03F8	1016	BRp LOOP
① ▶ x300E x6E00 28160 LDR R7,R0,#0 ③ ▶ x300F xF025 -4059 HALT ① ▶ x3010 x03FF 1023 forAND .FILL x03FF ③ ▶ x3011 x0063 99 Num .FILL #99 ① ▶ x3012 x3FFD 16381 NUMBER .FILL #16381 ③ ▶ x3013 x0001 1 Data .FILL 1 ④ ▶ x3014 x0001 1 .FILL 1 ④ ▶ x3015 x0002 2 .FILL 2 ④ ▶ x3016 x0004 4 .BLKW 16381 ④ ▶ x3017 x0006 6 .BLKW 16381 ④ ▶ x3019 x0012 18 .BLKW 16381 ● ▶ x301A x001E 30 .BLKW 16381	① ▶ x300E x6E00 28160 LDR R7,R0,#0 ③ ▶ x300F xF025 -4059 HALT ① ▶ x3010 x03FF 1023 forAND .FILL x03FF ③ ▶ x3011 x0063 99 Num .FILL #99 ① ▶ x3012 x3FFD 16381 NUMBER .FILL #16381 ③ ▶ x3013 x0001 1 Data .FILL 1 ④ ▶ x3014 x0001 1 .FILL 1 ④ ▶ x3015 x0002 2 .FILL 2 ④ ▶ x3016 x0004 4 .BLKW 16381 ④ ▶ x3017 x0006 6 .BLKW 16381 ④ ▶ x3019 x0012 18 .BLKW 16381 ● ▶ x301A x001E 30 .BLKW 16381	0	 	x300C	xE406	-7162	LEA R2,Data
① ▶ x300F xF025 -4059 HALT ① ▶ x3010 x03FF 1023 forAND .FILL x03FF ② ▶ x3011 x0063 99 Num .FILL #99 ③ ▶ x3012 x3FFD 16381 NUMBER .FILL #16381 ④ ▶ x3013 x0001 1 Data .FILL 1 ④ ▶ x3014 x0001 1 .FILL 1 ④ ▶ x3015 x0002 2 .FILL 2 ④ ▶ x3016 x0004 4 .BLKW 16381 ④ ▶ x3017 x0006 6 .BLKW 16381 ④ ▶ x3018 x000A 10 .BLKW 16381 ● ▶ x3019 x0012 18 .BLKW 16381 ● ▶ x301A x001E 30 .BLKW 16381	① ▶ x300F xF025 -4059 HALT ① ▶ x3010 x03FF 1023 forAND .FILL x03FF ② ▶ x3011 x0063 99 Num .FILL #99 ③ ▶ x3012 x3FFD 16381 NUMBER .FILL #16381 ④ ▶ x3013 x0001 1 Data .FILL 1 ④ ▶ x3014 x0001 1 .FILL 1 ④ ▶ x3015 x0002 2 .FILL 2 ④ ▶ x3016 x0004 4 .BLKW 16381 ④ ▶ x3017 x0006 6 .BLKW 16381 ④ ▶ x3018 x000A 10 .BLKW 16381 ● ▶ x3019 x0012 18 .BLKW 16381 ● ▶ x301A x001E 30 .BLKW 16381	0	 	x300D	x1002	4098	ADD R0,R0,R2
③ ▶ x3010 x03FF 1023 forAND .FILL x03FF ④ ▶ x3011 x0063 99 Num .FILL #99 ④ ▶ x3012 x3FFD 16381 NUMBER .FILL #16381 ⑥ ▶ x3013 x0001 1 Data .FILL 1 ⑥ ▶ x3014 x0001 1 .FILL 1 ⑥ ▶ x3015 x0002 2 .FILL 2 ⑥ ▶ x3016 x0004 4 .BLKW 16381 ⑥ ▶ x3017 x0006 6 .BLKW 16381 ⑥ ▶ x3018 x000A 10 .BLKW 16381 ⑥ ▶ x3019 x0012 18 .BLKW 16381 ⑥ ▶ x301A x001E 30 .BLKW 16381	3	0	 	x300E	x6E00	28160	LDR R7,R0,#0
● x3011 x0063 99 Num .FILL #99 ● x3012 x3FFD 16381 NUMBER .FILL #16381 ● x3013 x0001 1 Data .FILL 1 ● x3014 x0001 1 .FILL 1 ● x3015 x0002 2 .FILL 2 ● x3016 x0004 4 .BLKW 16381 ● x3017 x0006 6 .BLKW 16381 ● x3018 x000A 10 .BLKW 16381 ● x3019 x0012 18 .BLKW 16381 ● x301A x001E 30 .BLKW 16381	● x3011 x0063 99 Num .FILL #99 ● x3012 x3FFD 16381 NUMBER .FILL #16381 ● x3013 x0001 1 Data .FILL 1 ● x3014 x0001 1 .FILL 1 ● x3015 x0002 2 .FILL 2 ● x3016 x0004 4 .BLKW 16381 ● x3017 x0006 6 .BLKW 16381 ● x3018 x000A 10 .BLKW 16381 ● x3019 x0012 18 .BLKW 16381 ● x301A x001E 30 .BLKW 16381	0		x300F	xF025	-4059	HALT
● x3012 x3FFD 16381 NUMBER .FILL #16381 ● x3013 x0001 1 Data .FILL 1 ● x3014 x0001 1 .FILL 1 ● x3015 x0002 2 .FILL 2 ● x3016 x0004 4 .BLKW 16381 ● x3017 x0006 6 .BLKW 16381 ● x3018 x000A 10 .BLKW 16381 ● x3019 x0012 18 .BLKW 16381 ● x301A x001E 30 .BLKW 16381	● x3012 x3FFD 16381 NUMBER .FILL #16381 ● x3013 x0001 1 Data .FILL 1 ● x3014 x0001 1 .FILL 1 ● x3015 x0002 2 .FILL 2 ● x3016 x0004 4 .BLKW 16381 ● x3017 x0006 6 .BLKW 16381 ● x3018 x000A 10 .BLKW 16381 ● x3019 x0012 18 .BLKW 16381 ● x301A x001E 30 .BLKW 16381	0	 	x3010	x03FF	1023	forAND .FILL x03FF
① ▶ x3013 x0001 1 Data .FILL 1 ① ▶ x3014 x0001 1 .FILL 1 ① ▶ x3015 x0002 2 .FILL 2 ① ▶ x3016 x0004 4 .BLKW 16381 ① ▶ x3017 x0006 6 .BLKW 16381 ① ▶ x3018 x000A 10 .BLKW 16381 ① ▶ x3019 x0012 18 .BLKW 16381 ① ▶ x301A x001E 30 .BLKW 16381	① ▶ x3013 x0001 1 Data .FILL 1 ① ▶ x3014 x0001 1 .FILL 1 ① ▶ x3015 x0002 2 .FILL 2 ① ▶ x3016 x0004 4 .BLKW 16381 ① ▶ x3017 x0006 6 .BLKW 16381 ① ▶ x3018 x000A 10 .BLKW 16381 ① ▶ x3019 x0012 18 .BLKW 16381 ① ▶ x301A x001E 30 .BLKW 16381	0	 	x3011	x0063	99	Num .FILL #99
<pre></pre>	<pre></pre>	0	>	x3012	x3FFD	16381	NUMBER .FILL #16381
<pre>① ▶ x3015</pre>	<pre>① ▶ x3015</pre>	0	>	x3013	x0001	1	Data .FILL 1
<pre></pre>	<pre></pre>	0	 	x3014	x0001	1	.FILL 1
		0		x3015	x0002	2	.FILL 2
		0	>	x3016	x0004	4	.BLKW 16381
		0	>	x3017	x0006	6	.BLKW 16381
① ▶ x301A	① ▶ x301A x001E 30 .BLKW 16381	0	>	x3018	X000A	10	.BLKW 16381
① ▶ x301A	① ▶ x301A x001E 30 .BLKW 16381						
★ x301B x0032 50 .BLKW 16381	A 1 1201 10000 FO DIW 10001	•	>	x3019	x0012	18	.BLKW 16381
	301B X0032 50 .BLKW 16381	_					
★ x301C x0056 86 .BLKW 16381	A > 2016 2015 201	0	>	x301A	x001E	30	.BLKW 16381
★ x301D x0092 146 .BLKW 16381	₩ ×301C X0056 86 .BLKW 16381	0	>	x301A x301B	x001E x0032	30	.BLKW 16381 .BLKW 16381
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↑ ► •201₽ •01⊼2 /10 RIKW 16381		0 0	 	x301A x301B x301C x301D	x001E x0032 x0056 x0092	30 50 86 146	.BLKW 16381 .BLKW 16381 .BLKW 16381
WOLE XOLE TO THE TOTAL		0 0 0		x301A x301B x301C x301D x301E	x001E x0032 x0056 x0092 x00F6	30 50 86 146 246	.BLKW 16381 .BLKW 16381 .BLKW 16381 .BLKW 16381 .BLKW 16381
	<pre> ① ▶ x301D</pre>	0 0 0 0	>>>>	x301A x301B x301C x301D x301E x301F	x001E x0032 x0056 x0092 x00F6 x01A2	30 50 86 146 246 418	.BLKW 16381 .BLKW 16381 .BLKW 16381 .BLKW 16381 .BLKW 16381 .BLKW 16381
	<pre></pre>	0 0 0 0 0	>>>>>	x301A x301B x301C x301D x301E x301F x3020	x001E x0032 x0056 x0092 x00F6 x01A2 x02C6	30 50 86 146 246 418	.BLKW 16381
① ▶ x3020 x02C6 710 .BLKW 16381	<pre></pre>	0 0 0 0 0 0 0 0	>>>>>	x301A x301B x301C x301D x301E x301F x3020 x3021	x001E x0032 x0056 x0092 x00F6 x01A2 x02C6 x00B2	30 50 86 146 246 418 710	.BLKW 16381
① ▶ x3020 x02C6 710 .BLKW 16381 ① ▶ x3021 x00B2 178 .BLKW 16381	<pre> ① ▶ x301D</pre>	0 0 0 0 0 0	>>>>>>	x301A x301B x301C x301D x301E x301F x3020 x3021 x3022	x001E x0032 x0056 x0092 x00F6 x01A2 x02C6 x00B2 x03F6	30 50 86 146 246 418 710 178	.BLKW 16381
<pre> ① ▶ x3020</pre>	<pre></pre>	0 0 0 0 0 0	>>>>>>	x301A x301B x301C x301D x301E x301F x3020 x3021 x3022 x3023	x001E x0032 x0056 x0092 x00F6 x01A2 x02C6 x00B2 x03F6 x0182	30 50 86 146 246 418 710 178 1014 386	.BLKW 16381
<pre> ① ▶ x3020</pre>	<pre></pre>	0 0 0 0 0 0 0	> >	x301A x301B x301C x301D x301E x301F x3020 x3021 x3022 x3023	x001E x0032 x0056 x0092 x00F6 x01A2 x02C6 x00B2 x03F6 x0182 x02E6	30 50 86 146 246 418 710 178 1014 386 742	.BLKW 16381
<pre></pre>	① ▶ x301D x0092 146 .BLKW 16381 ① ▶ x301E x00F6 246 .BLKW 16381 ① ▶ x301F x01A2 418 .BLKW 16381 ① ▶ x3020 x02C6 710 .BLKW 16381 ② ▶ x3021 x00B2 178 .BLKW 16381 ③ ▶ x3022 x03F6 1014 .BLKW 16381 ③ ▶ x3023 x0182 386 .BLKW 16381 ① ▶ x3024 x02E6 742 .BLKW 16381 ① ▶ x3025 x02D2 722 .BLKW 16381	0 0 0 0 0 0 0	> >	x301A x301B x301C x301D x301E x301F x3020 x3021 x3022 x3023 x3024 x3025	x001E x0032 x0056 x0092 x00F6 x01A2 x02C6 x00B2 x03F6 x0182 x02E6 x02D2	30 50 86 146 246 418 710 178 1014 386 742 722	.BLKW 16381
<pre> ① ▶ x3020 x02C6 710</pre>	3	0 0 0 0 0 0 0 0	> >	x301A x301B x301C x301D x301E x301F x3020 x3021 x3022 x3022 x3023 x3024 x3025 x3026	x001E x0032 x0056 x0092 x00F6 x01A2 x02C6 x00B2 x03F6 x0182 x02E6 x02D2 x01D6	30 50 86 146 246 418 710 178 1014 386 742 722 470	.BLKW 16381
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改进版本

充分利用寄存器,存储三个数据并计算下一位数据,计算完毕后进行位置移动。

R7=F(n),R1=F(n+1),R2=F(n+2)

计算F(n+3)=R3=R2+2*R7,之后进行移位

 $R7\leftarrow R1,R1\leftarrow R2,R2\leftarrow R3$

由此可实现了R7从F(n)到F(n+1)的变化

根据n=n-1是否为小于则可以判断是否输出。此算法可输出n=0的情况。

.ORIG x3000

ADD R1,R1,#1

ADD R2,R2,#1

ADD R3,R3,#2

LOOP ADD R7,R1,#0 ;移位开始

ADD R1,R2,#0

ADD R2,R3,#0 ;移位结束

ADD R3,R7,R7

ADD R3,R2,R3 ;计算R3

ADD R0,R0,#-1 BRzp LOOP LD R6,forAND

AND R7,R7,R6

HALT

forAND .FILL x03FF

Fa .FILL x03A2

Fb .FILL x0002

Fc .FILL x000A

Fd .FILL x0356

.END

正确性检验

初始版和改进版采用两种不同的算法,则直接对比两者的结果输出,可知其基本正确。

输入n	初始版结果	改进版结果
20	930	930
2	2	2
5	10	10
99	854	854

行数计算

改进前的版本为27行,改进后减少至18行。