AUTIA, AUTIA1716, AUTIASP, AUTIAZ, AUTIZA

Authenticate Instruction address, using key A. This instruction authenticates an instruction address, using a modifier and key A.
The address is:

- In the general-purpose register that is specified by <Xd> for `AUTIA` and `AUTIZA`.
- In X17, for `AUTIA1716`.
- In X30, for `AUTIASP` and `AUTIAZ`.

The modifier is:

- In the general-purpose register or stack pointer that is specified by <Xn|SP> for `AUTIA`.
- The value zero, for `AUTIZA` and `AUTIAZ`.
- In X16, for `AUTIA1716`.
- In SP, for `AUTIASP`.

If the authentication passes, the upper bits of the address are restored to enable subsequent use of the address. For information on behavior if the authentication fails, see *Faulting on pointer authentication*.
It has encodings from 2 classes: Integer and System

Integer
(FEAT_PAuth)

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	1	0	1	1	0	1	0	1	1	0	0	0	0	0	1	0	0	Z	1	0	0	Rn					Rd				

AUTIA (Z == 0)

```
AUTIA <Xd>, <Xn|SP>
```

AUTIZA (Z == 1 && Rn == 11111)

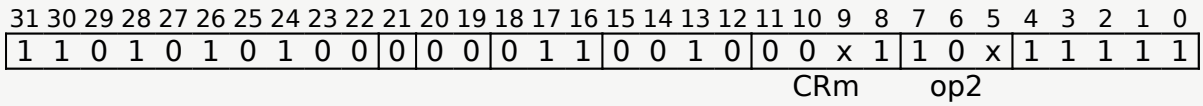
```
AUTIZA <Xd>
```

```
boolean source_is_sp = FALSE;
integer d = UInt(Rd);
integer n = UInt(Rn);

if !IsFeatureImplemented(FEAT_PAuth) then
    UNDEFINED;

if Z == '0' then // AUTIA
    if n == 31 then source_is_sp = TRUE;
else // AUTIZA
    if n != 31 then UNDEFINED;
```

System
(FEAT_PAuth)



AUTIA1716 (CRm == 0001 && op2 == 100)

```
AUTIA1716
```

AUTIASP (CRm == 0011 && op2 == 101)

```
AUTIASP
```

AUTIAZ (CRm == 0011 && op2 == 100)

```
AUTIAZ
```

```
integer d;
integer n;
boolean source_is_sp = FALSE;

case CRm:op2 of
    when '0011 100'    // AUTIAZ
        d = 30;
        n = 31;
    when '0011 101'    // AUTIASP
        d = 30;
        source_is_sp = TRUE;
    when '0001 100'    // AUTIA1716
        d = 17;
        n = 16;
    when '0001 000' SEE "PACIA";
    when '0001 010' SEE "PACIB";
    when '0001 110' SEE "AUTIB";
    when '0011 00x' SEE "PACIA";
    when '0011 01x' SEE "PACIB";
    when '0011 11x' SEE "AUTIB";
    when '0000 111' SEE "XPACLRI";
    otherwise SEE "HINT";
```

Assembler Symbols

<Xd>	Is the 64-bit name of the general-purpose destination register, encoded in the "Rd" field.
<Xn|SP>	Is the 64-bit name of the general-purpose source register or stack pointer, encoded in the "Rn" field.

Operation

```
if IsFeatureImplemented(FEAT_PAuth) then
    if source_is_sp then
        X[d, 64] = AuthIA(X[d, 64], SP[], FALSE);
    else
        X[d, 64] = AuthIA(X[d, 64], X[n, 64], FALSE);
```

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