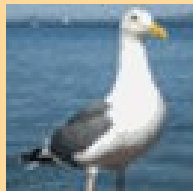# Inter-process method invocation in Android

2011.4.9

Tetsuyuki Kobayashi

Who am I?

- 20+ years involved in embedded systems
  - 10 years in real time OS, such as iTRON
  - 10 years in embedded Java Virtual Machine
  - Now GCC, Linux, QEMU, Android, …
- Blogs
  - http://d.hatena.ne.jp/embedded/ (Personal)
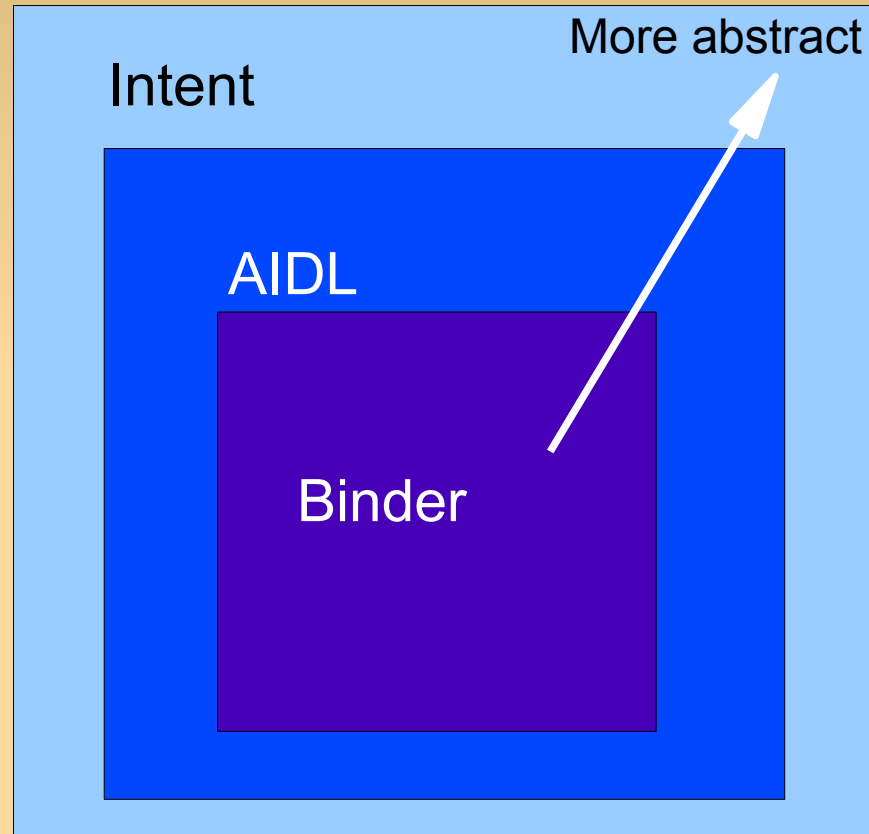 - http://blog.kmckk.com/ (Corporate)
- Twitter
  - @tetsu_koba

Today's topic

- inter process communications in Android

- Inter process method invocation using Binder

- AIDL

- Example of inter process method invocation

Inter Process Communication
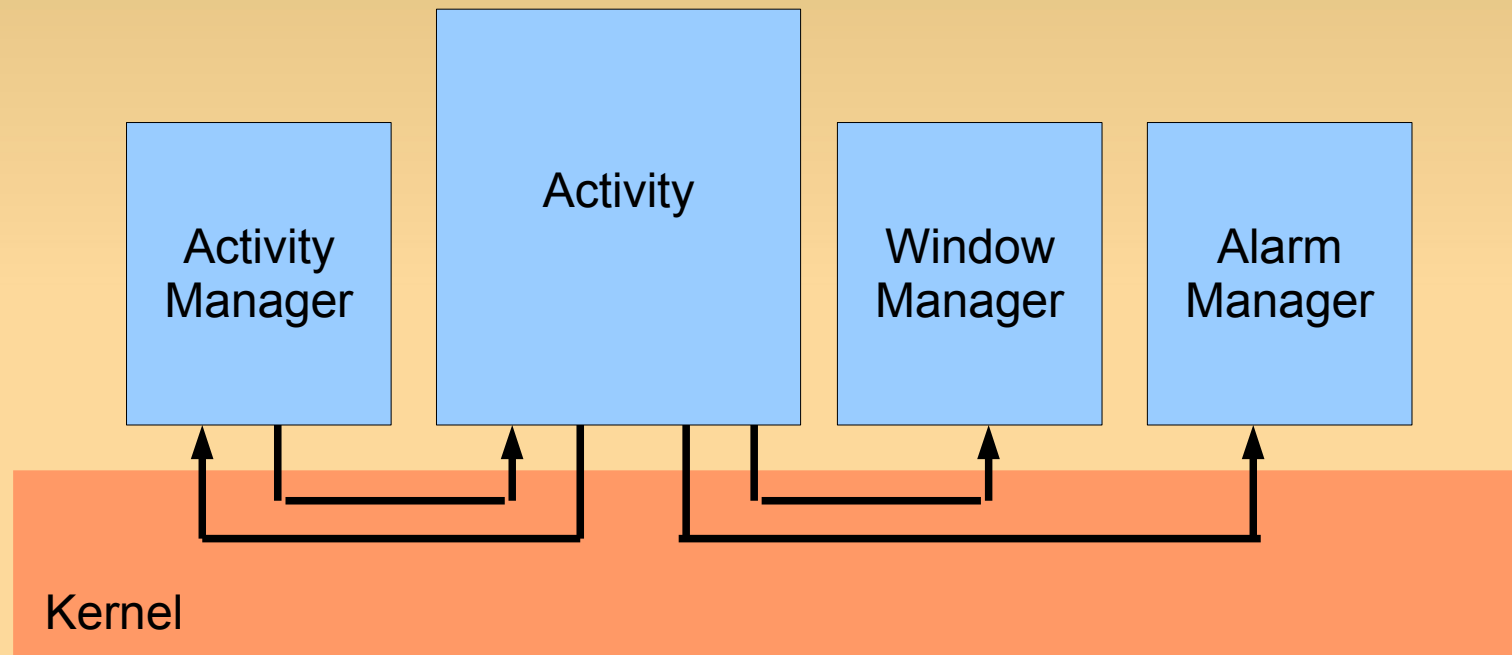
Abstraction of Inter Process Communication

Intent
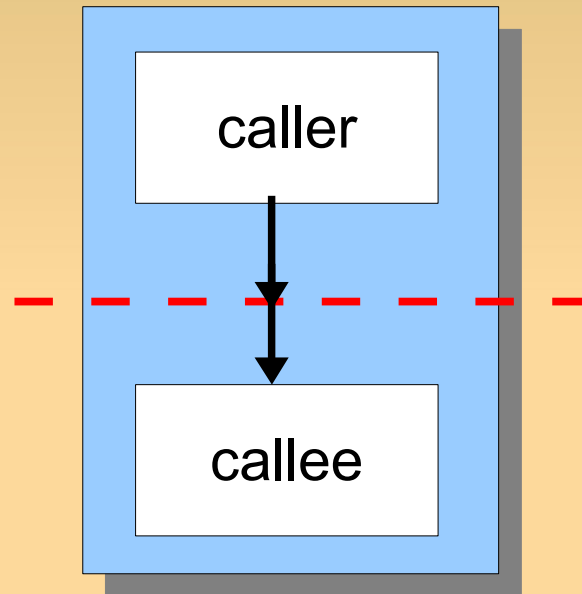
More abstract

AIDL

Binder

No need to use Binder directly.
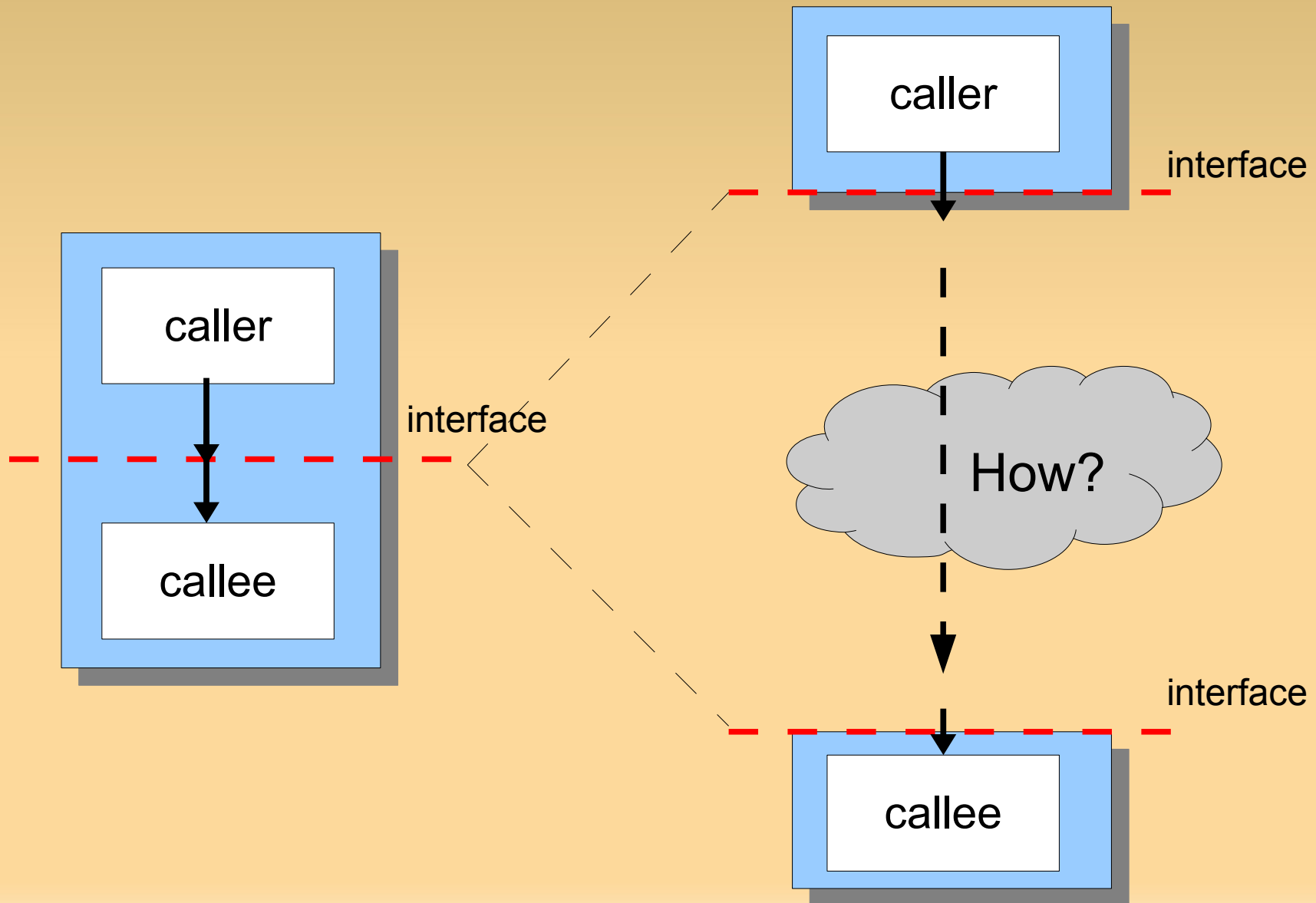AIDL requires multi-thread programming
In most case Intent is easy and powerful enough.
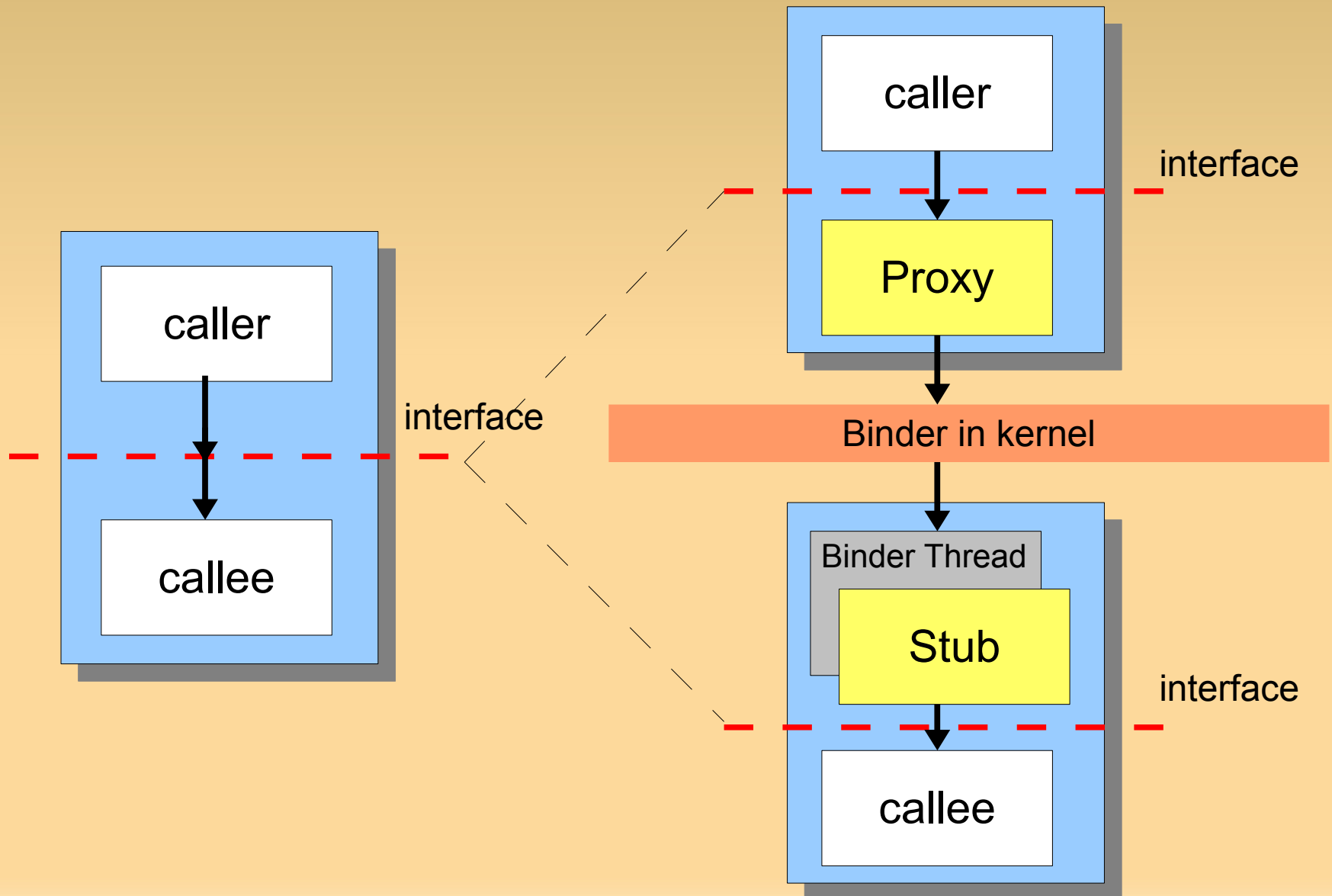
Invoking method via interface
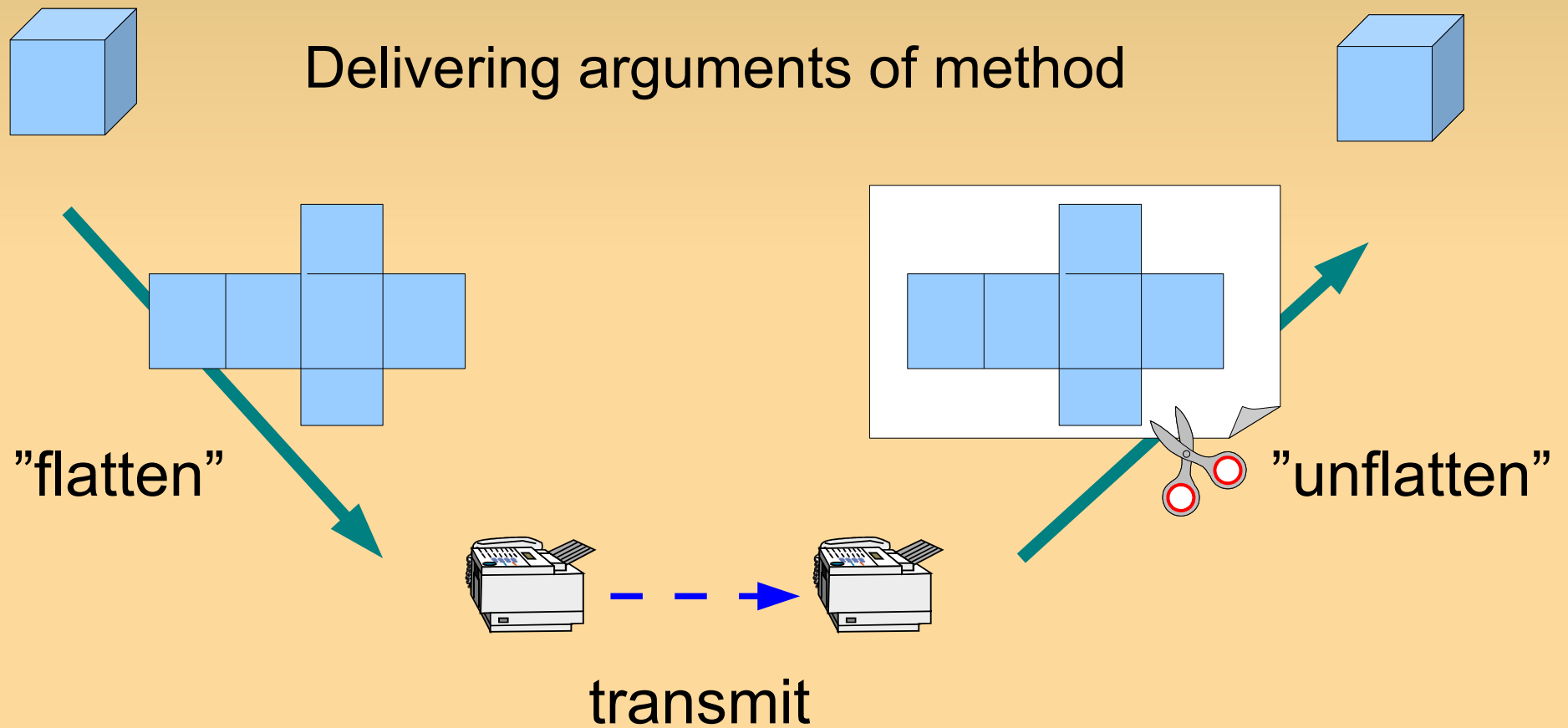

In the same process

Inter-process invocation

Inter-process invocation

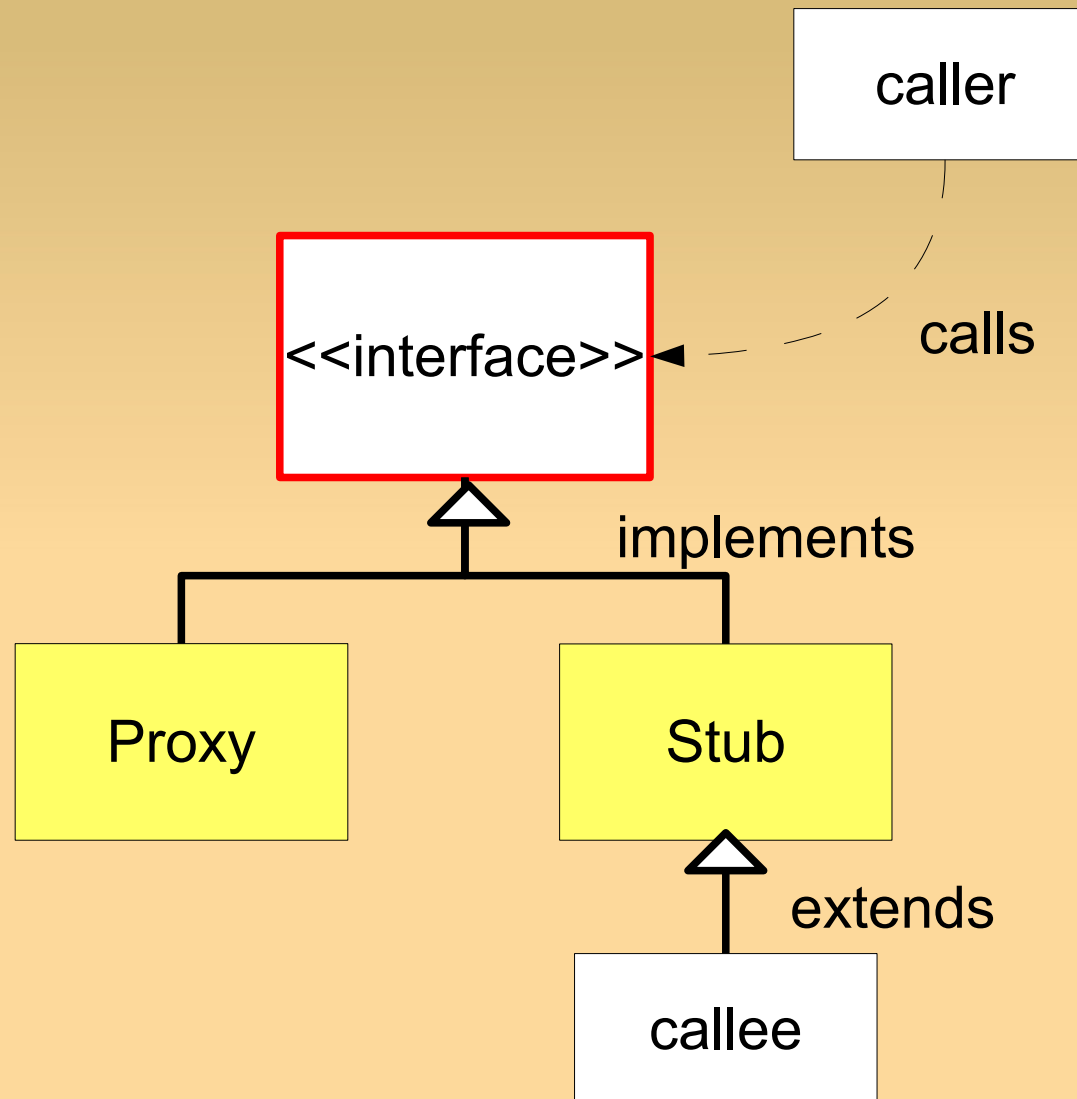# android.os.Parcel

Delivering arguments of method

"flatten"

transmit

"unflatten"

Describing in UML ...

<<interface>>

Proxy

Stub

Describing in UML ...

AIDL

Auto generated from .aidl file

caller

<<interface>>

Proxy

Stub

callee
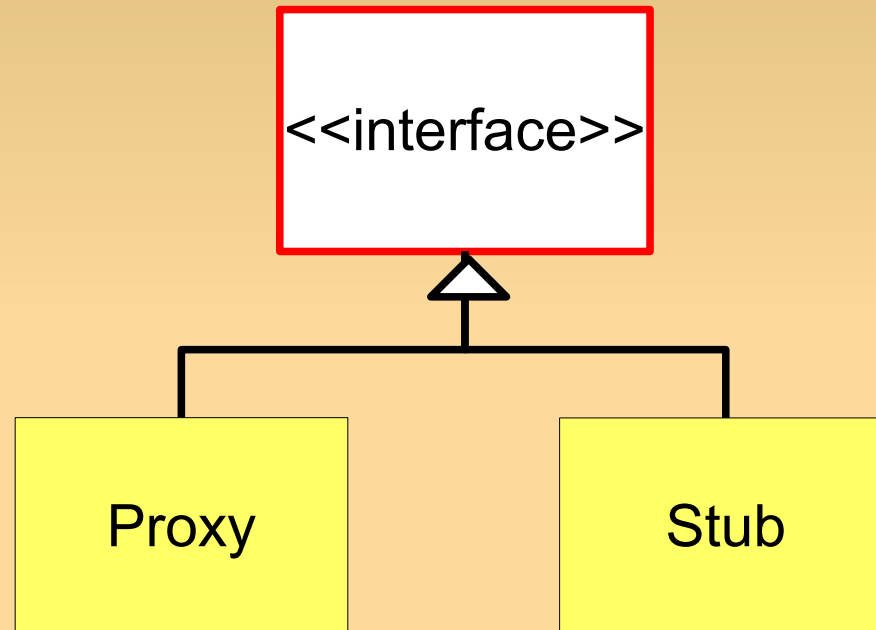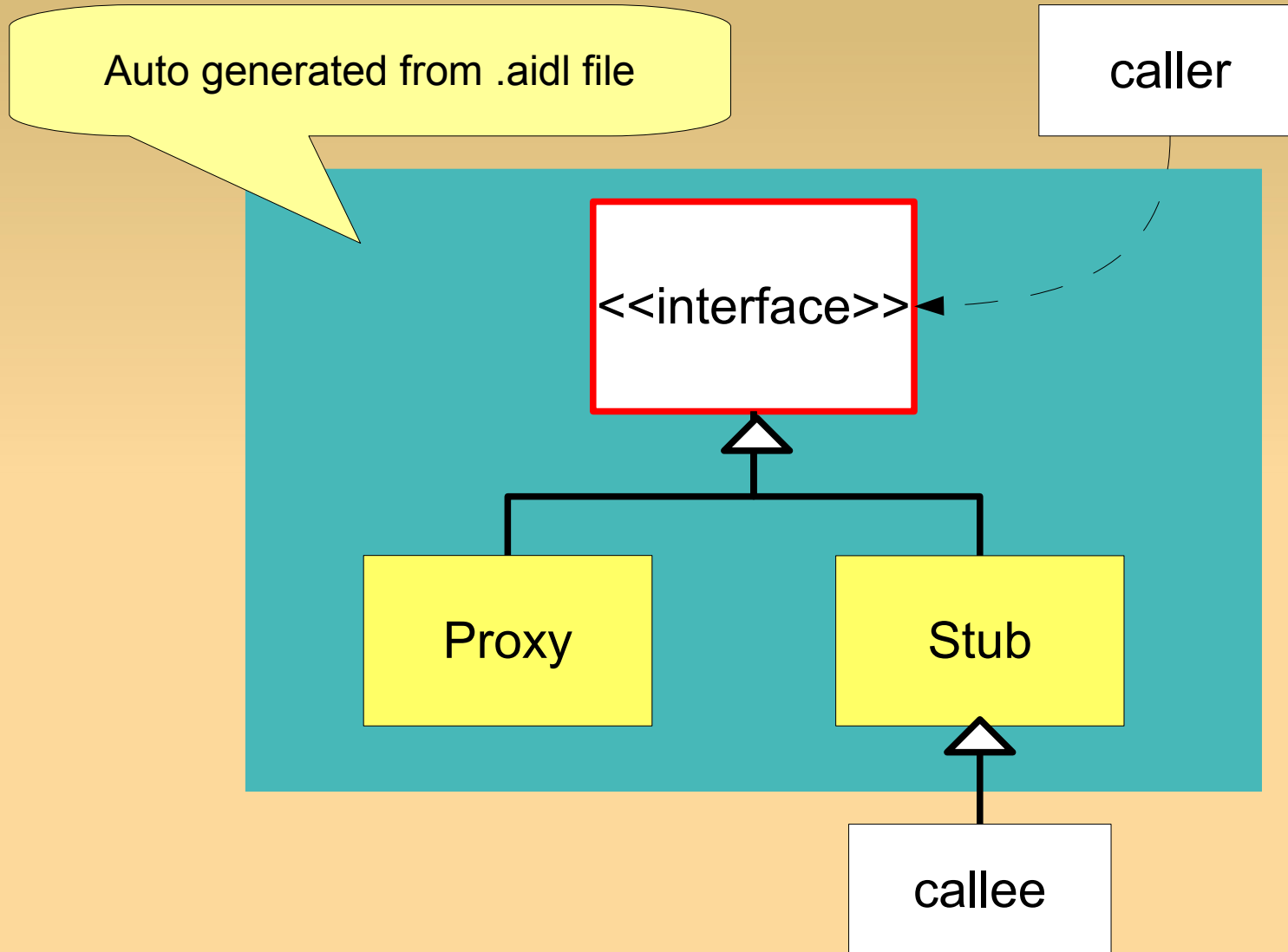
Use case: Who calls "onPause" in Activity?

2:Send message by Handler

Activity

3:"onPause" is called in main thread

queue

Looper

Activity Manager

Binder Thread #1

Main Thread

Kernel

1:Call "schedulePauseActivity" across process
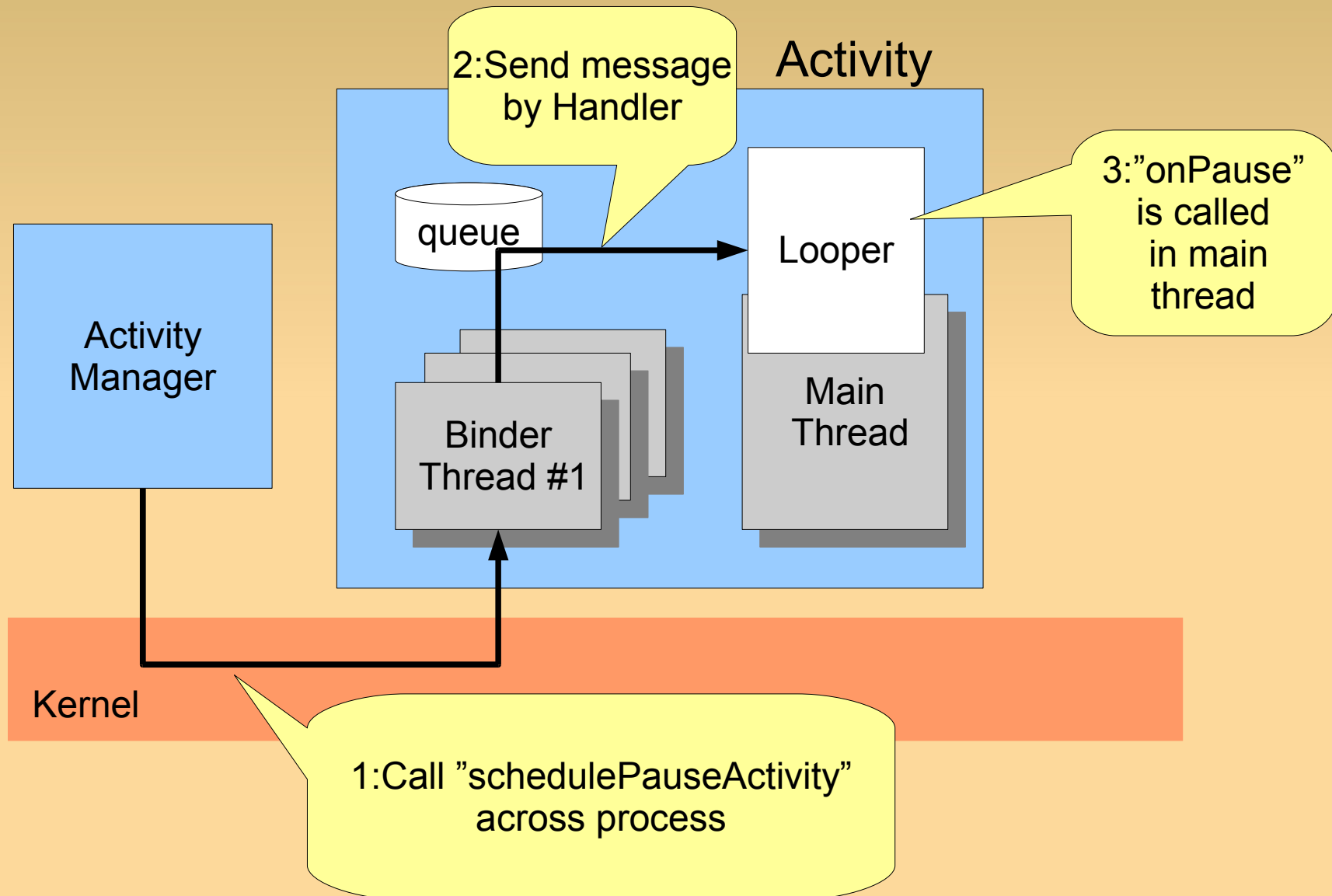
Binder

- /etc/binder

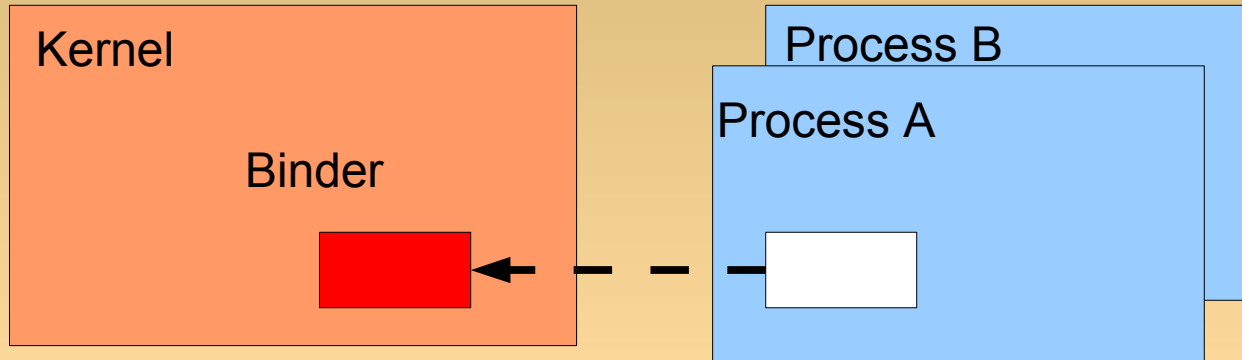- Not for general purpose. Tuned for specific transaction.

- Multi-thread aware

  - Have internal data per thead

  - (CF. Socket have internal data per fd.)

- Not use "write" and "read". Write and read at once by "ioctl".

Transaction of Binder

Process A and B have different memory space.
They can not see each other.

Kernel

Process B

Process A

Binder

Copy memory by copy_from _user

Then, wake up process B

Kernel

Process B

Binder

Process A
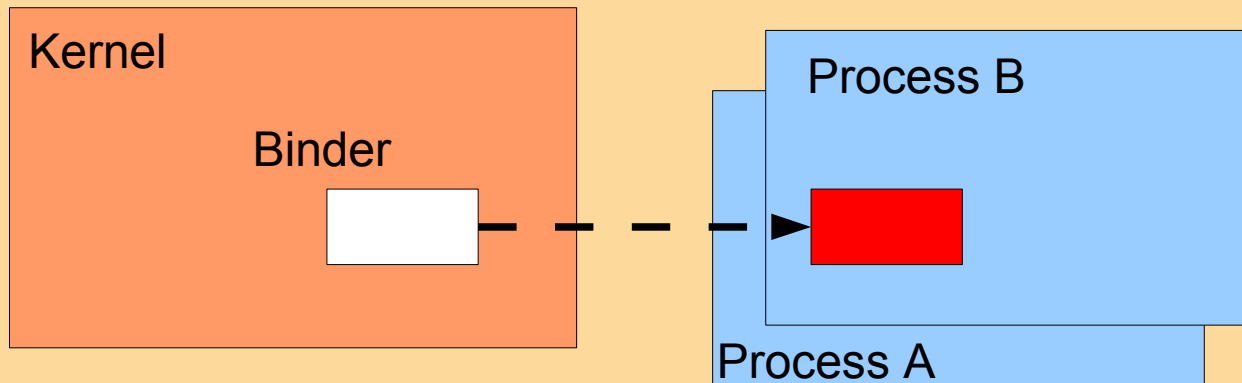
Copy memory by copy_to_user

See also

- 3rd session of Yokohama Android Platform club

  - http://www.yokohama.android-pf.org/study/dai-san-kai-benkyou-kai

- 1st session of Android SDK work group

  - http://www.android-group.jp/index.php?%CA%D9%B6%AF%B2%F1%2FAndr

- KMC blog

  - http://blog.kmckk.com/archives/3611344.html

  - http://blog.kmckk.com/archives/3613707.html

  - http://blog.kmckk.com/archives/3627888.html

  - http://blog.kmckk.com/archives/3645070.html

  - http://blog.kmckk.com/archives/3647635.html

  - http://blog.kmckk.com/archives/3617229.html

Q & A

Thank you for listening!
Any comments to blogs are welcome.