Effective Handling of Low Memory Scenarios in Android

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AAKASH tablet for every indian

NME-ICT(MHRD),AAKASH PROJECT, IIT BOMBAY

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सत्यमेव जयते

The National Mission on Education through ICT (NME-ICT)

Agenda

- Objective
- Process Management in Android
- Effective Memory Management
  - Telephone Hardware Checking
  - Improved Activity Manager Service
- Low Memory Killer in Android
  - How does Low Memory Killer work
  - Problems in Low Memory Killer
- Conclusion

Objective

In low memory scenarios, low memory killer and Activity Manager kill some of the applications in the system.

- Don't kill applications, in which user interesting
- Improve speed of device
- Increase memory utilization

Process Management in Android

Classification of Processes

- Foreground(active) – user currently focused.
- visible process – Bounded to foreground process.

Process Management in Android

Classification of Processes

- Service Process – Running on background (playing music).
- Hidden Process – which is not visible(background).

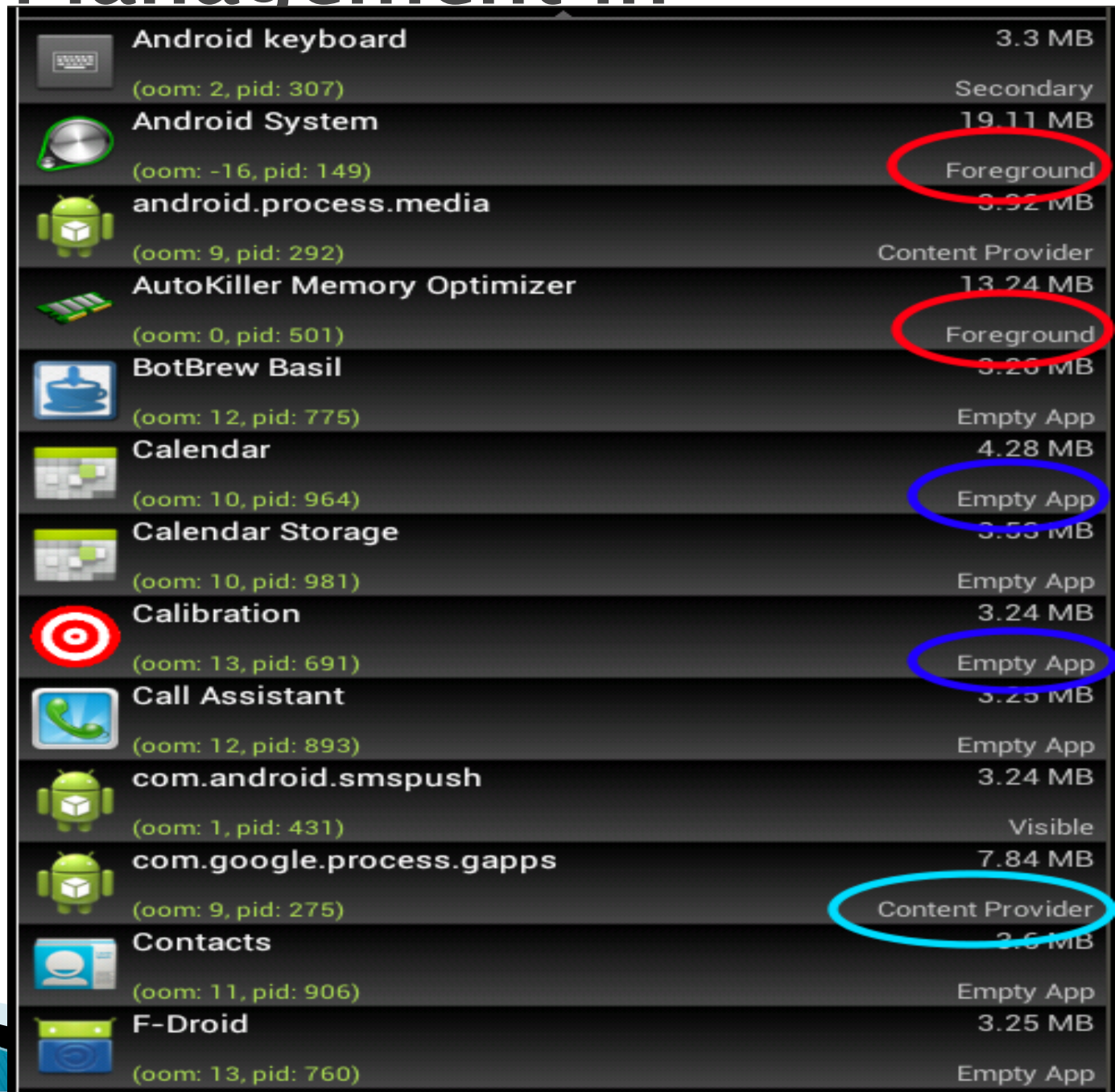
Process Management in Android

Classification of Processes:

- Content Provider – Provides structural data (contacts)
- Empty process which was already terminated. It is still present in main memory.

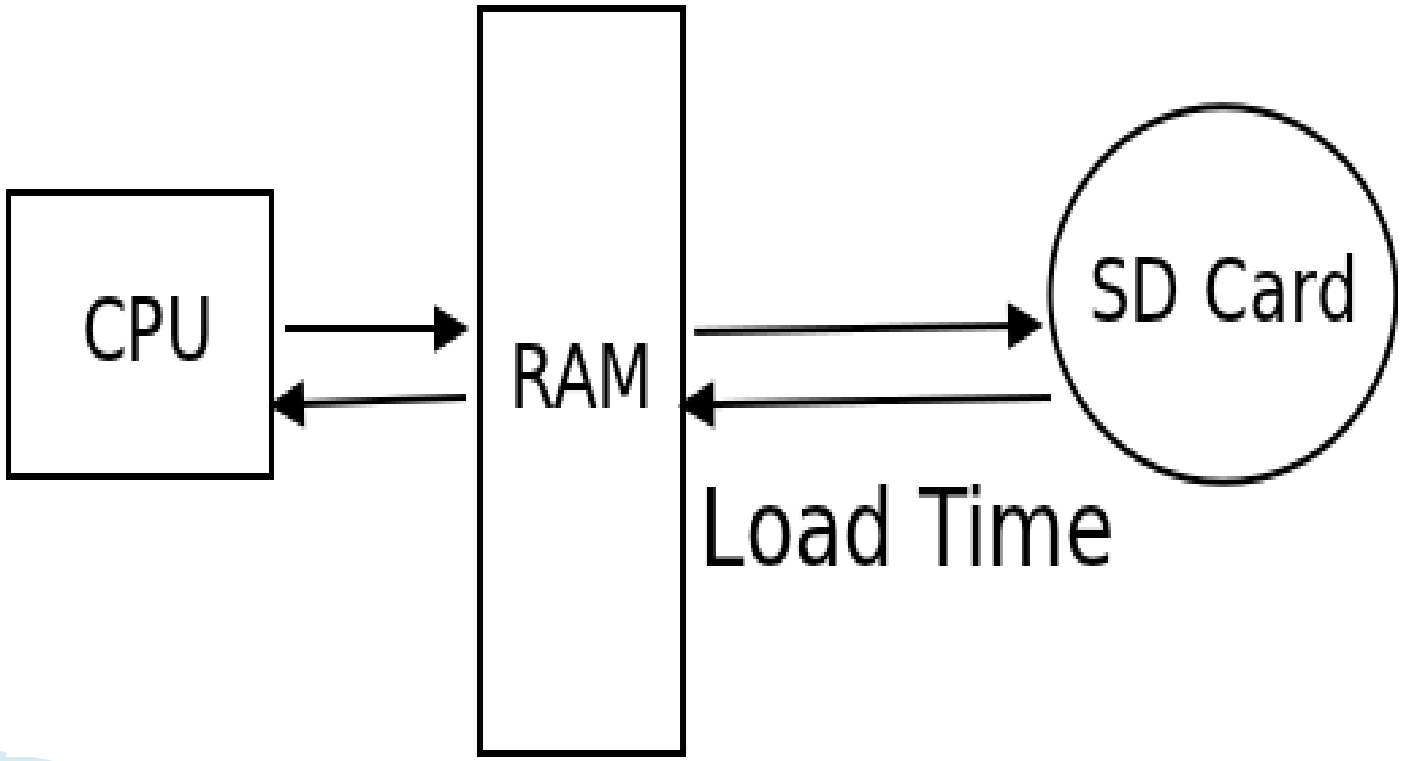
Process Management in Android

Different Groups of Apps in RAM



Advantages of Empty Applications

- Reduce load time, power consumption



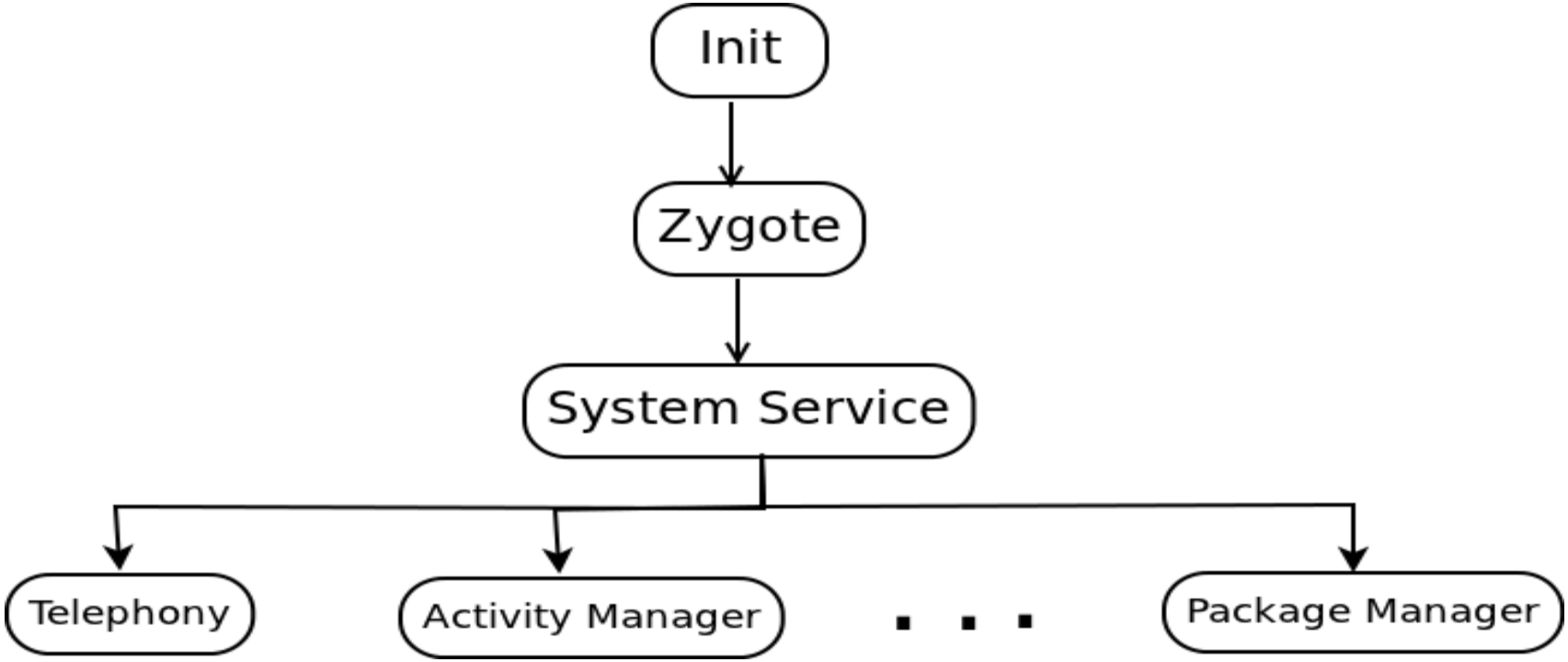
Disadvantages of Empty Applications

- Low free memory

- Too much off Empty Apps increases load time for Apps which are not there in RAM

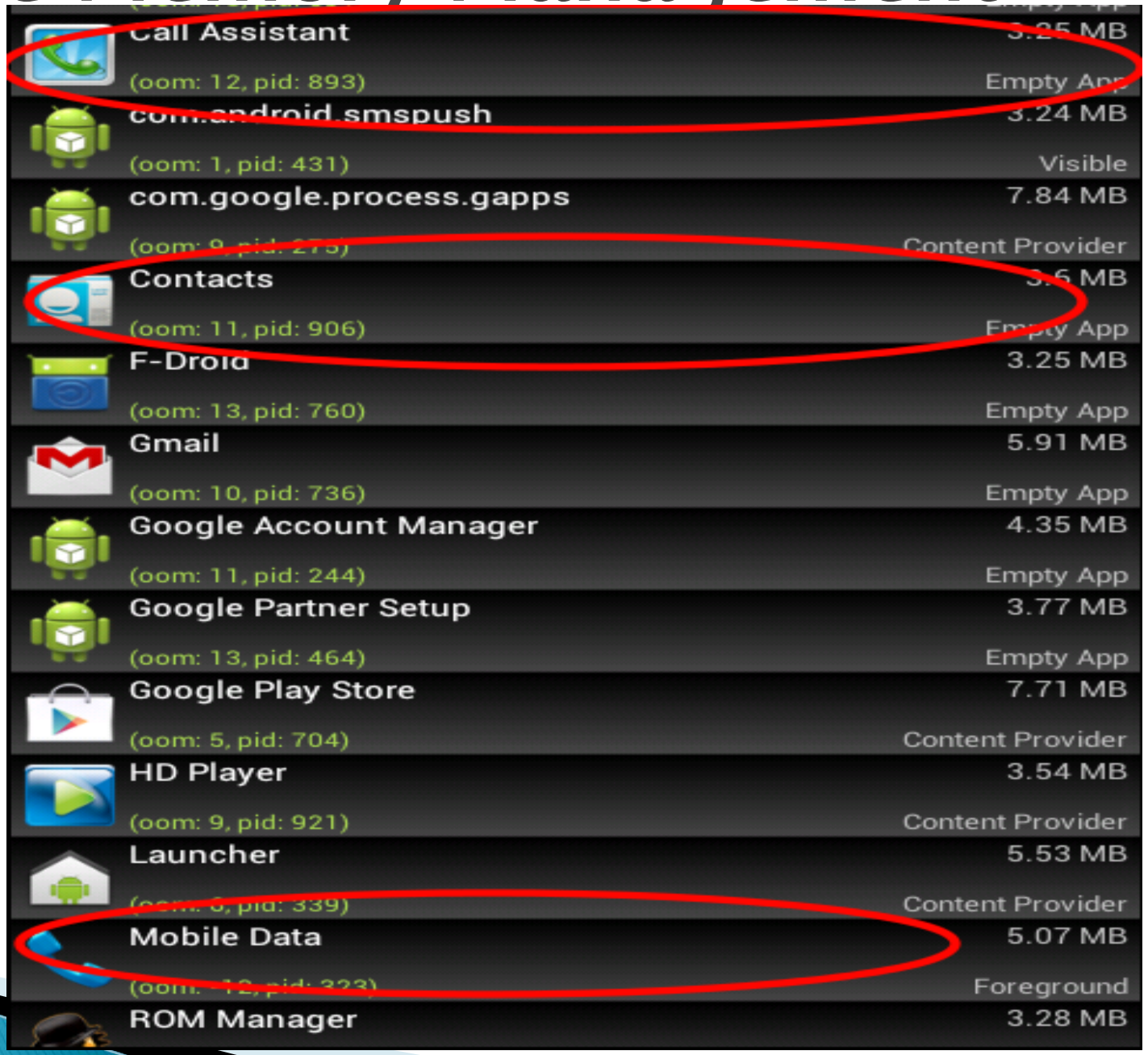
Effective Memory Management

- Loading Services during Booting



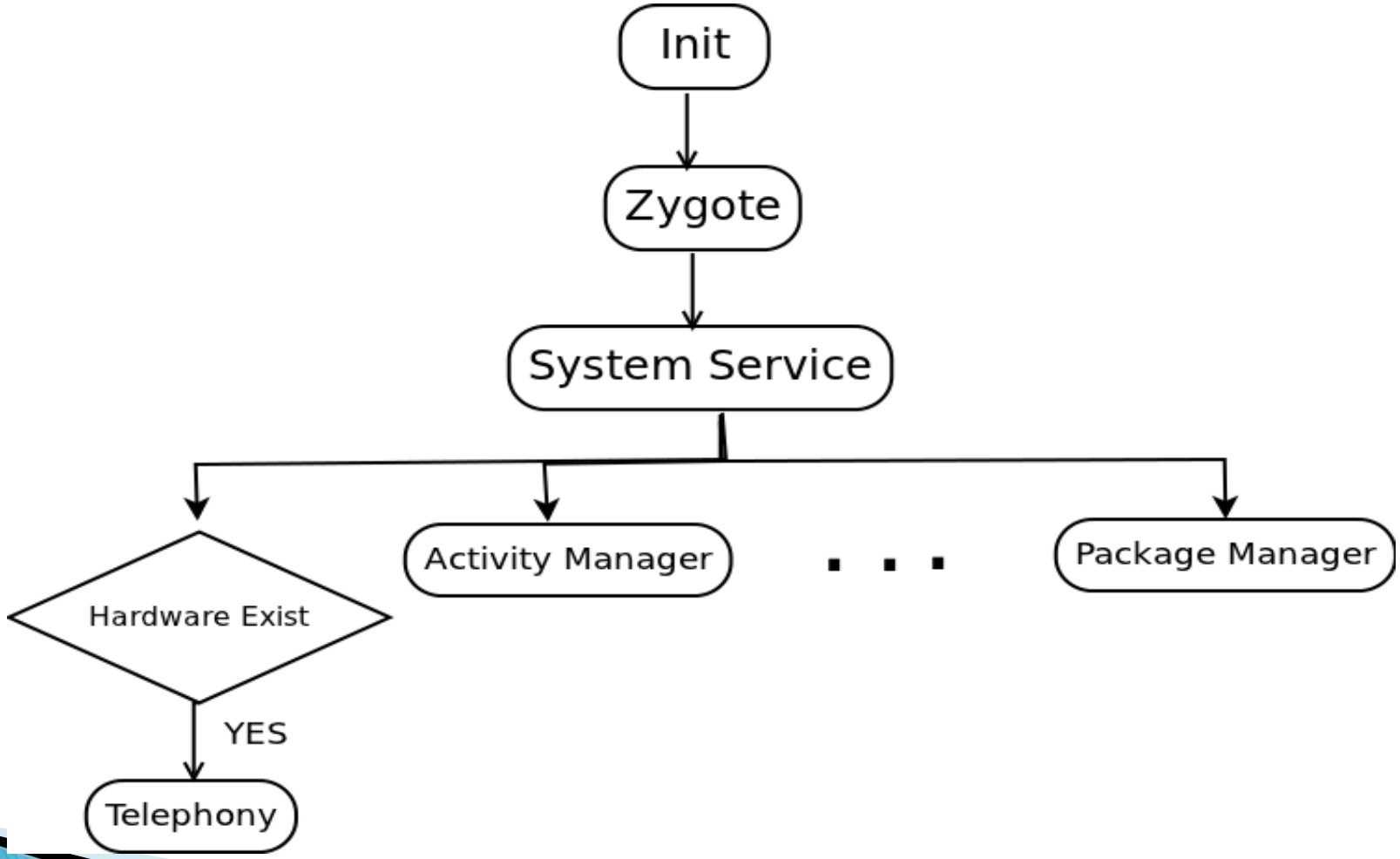
Effective Memory Management

List of Phone Related Apps Loaded in RAM



Effective Memory Management

- Remove Phone Related Apps from RAM



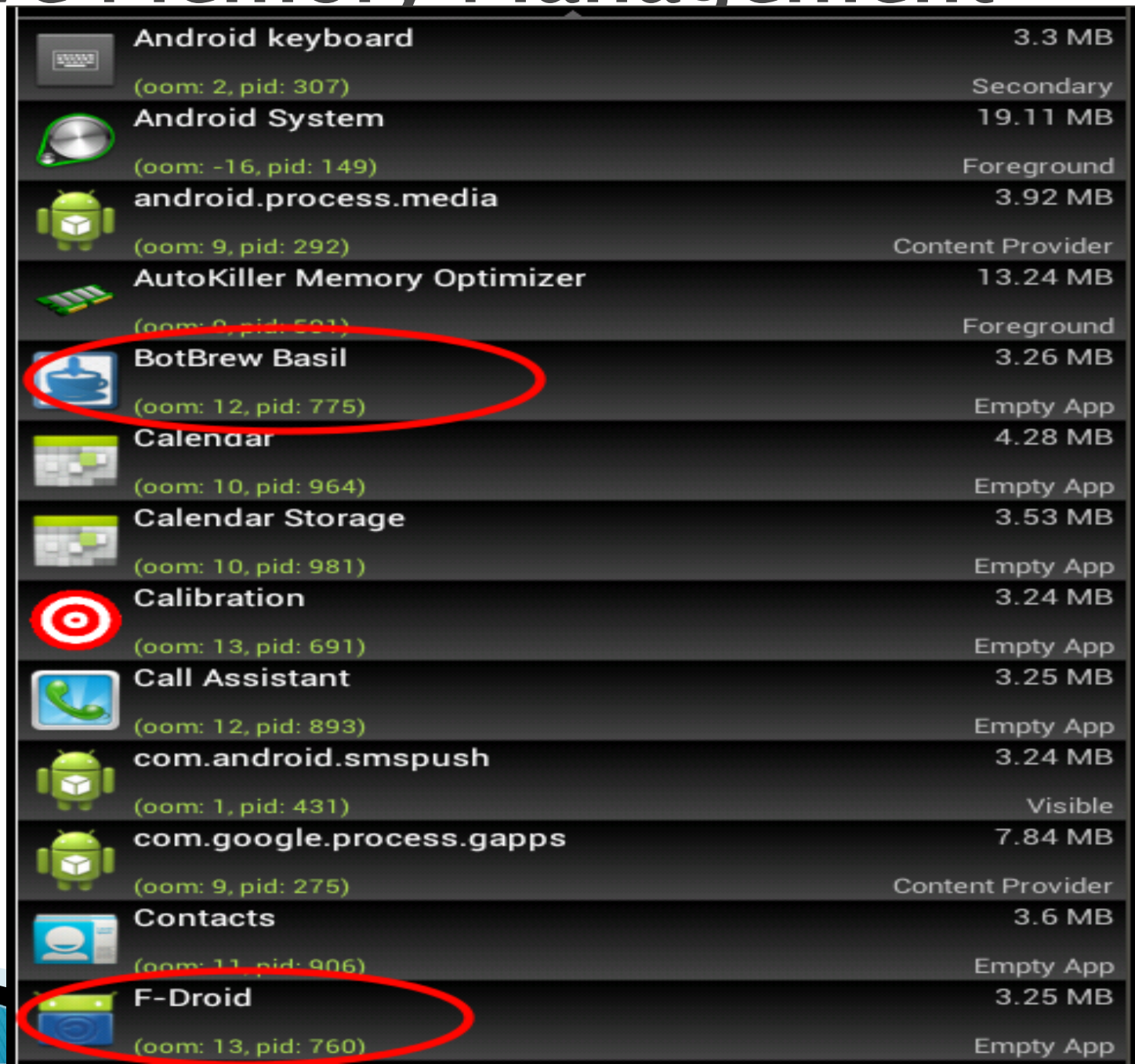
Effective Memory Management

Functionality of Activity Manager Service

- Launching Applications
- Updating Application status
- Killing Applications

Effective Memory Management

List of Apps Loaded into RAM By Activity Manager Service



Effective Memory Management

List of Apps Loaded into RAM By Activity Manager Service

Effective Memory Management

- Permissions needed to load an App during booting

▪< application android:persistent=”true” >

▪< uses-permission android:name=“android.permission. RECEIVE _BOOT_COMPLETED” >

Effective Memory Management

- How can we improve speed and reduce page faults

Improved Activity Manager Service {

1. Maintain Log history of Apps
2. Preload user interesting Apps after boot based on time
3. Increase priority of user interesting Apps during runtime

}

Low Memory Killer in Android

- How does Low Memory Killer work (Values in below table are taken from Aakash tablet, with RAM 512MB.)

Group Name	*oom _Adj Threshold*	*Minfree Thresholds*
Foreground	0	1MB
Visible	1	3MB
Secondary	2	4MB
Hidden	4	7MB
Content Provider	9	8MB
Empty	15	10MB

Low Memory Killer in Android

- Low Minfree Thresholds

Pros	*Cons*
Improves degree of multi programming	Increases Lag time
Reduces response time of frequently accessed applications	Increases number of page faults

Low Memory Killer in Android

- High Minfree Thresholds

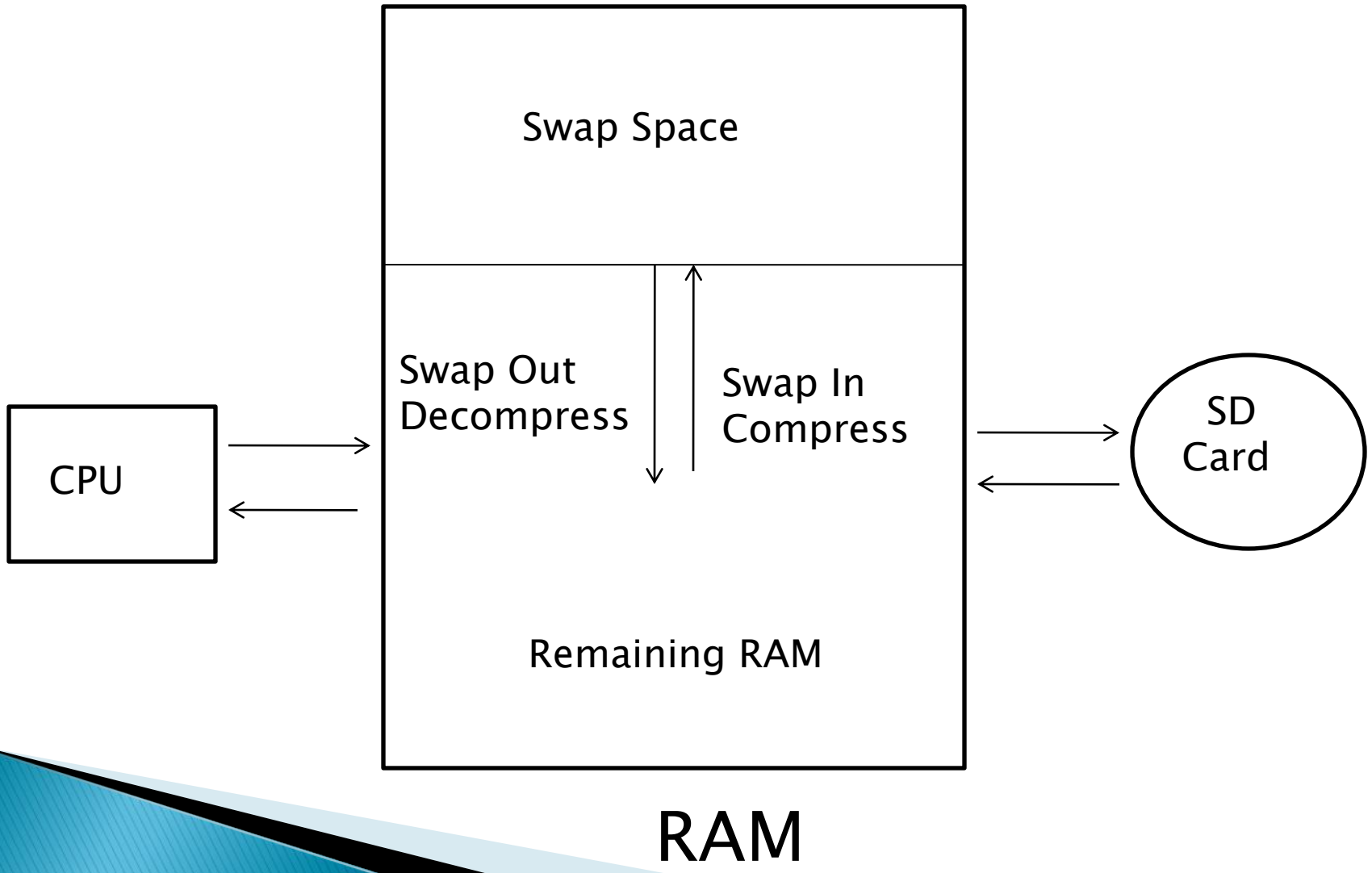
Pros	*Cons*
Decreases Lag time	Decreases degree of multi programming
Less number of page faults	Increases response time of frequently accessed applications

Problems in Low Memory Killer in Android

- Complaint from Android users[4] Default minfree values in their system, do not give good performance

- Static minfree values suitable in not all the situations.

Compressed Cache



Conclusions

- Improves user experience
- Decreases load time of applications.
- Achieves effective memory utilization (not too much of free memory and less page faults)

References

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