

**Workshop on Computer Science and Information Technologies  
CSIT'2000**

# **Implementation Principles of File Management System for Omega Parallel DBMS**

---

**Mikhail L. Zymbler, Leonid B. Sokolinsky**  
Chelyabinsk State University, Russia  
mzym@csu.ru sokolinsky@acm.org

**This work was supported by the Russian Foundation for Basic Research  
under Grant 00-07-90077**

# Contents

---

- Omega Project
- Omega File Management System
- Buffer Pool Management
- Experimental Results
- Conclusion

# Contents

---

- **Omega Project**
- Omega File Management System
- Buffer Pool Management
- Experimental Results
- Conclusion

# Omega Project

---

- *Place*  
Chelyabinsk State University, Russia
- *Aim*  
Parallel DBMS for MBC-100
- *Info*  
<http://www.csu.ru/~sok/OmegaProject>

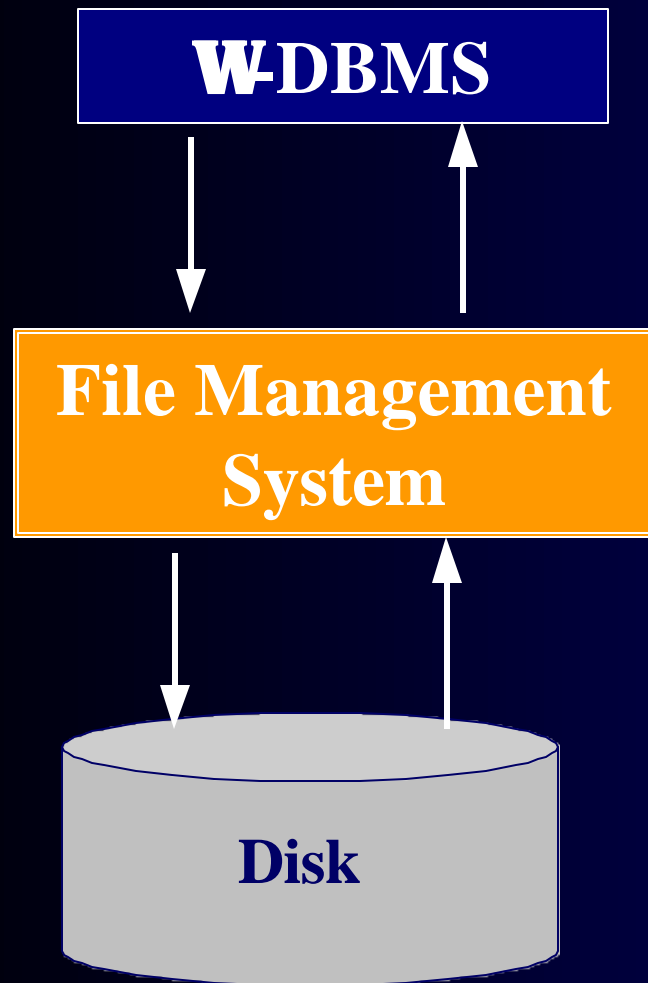
# Contents

---

- Omega Project
- **Omega File Management System**
- Buffer Pool Management
- Experimental Results
- Conclusion

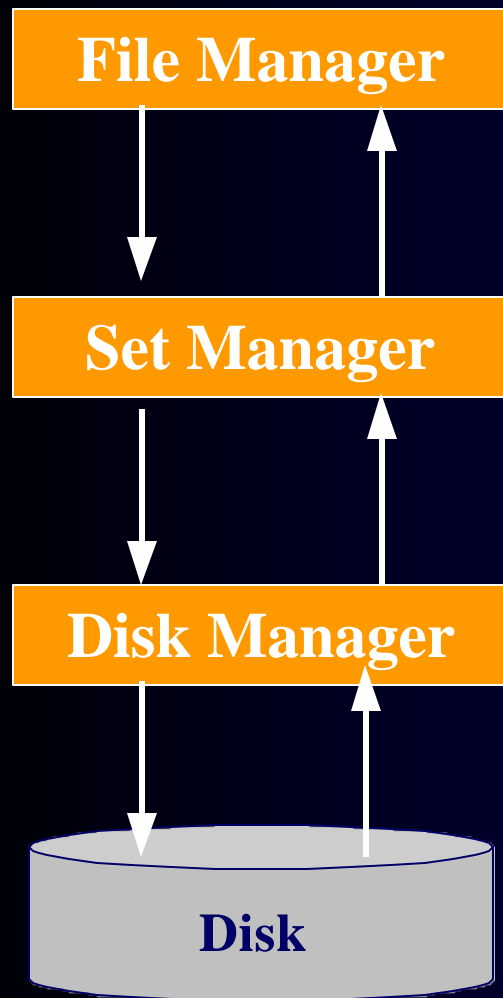
# Omega File Management System

---



- Supports file organization of database

# Structure of $\Omega$ -File Management System



- Supports files  
Provides high-level i/o functions
- Supports page sets  
Provides page buffering
- Supports page organization of disk  
Provides low-level i/o functions

# Contents

---

- Omega Project
- Omega File Management System
- **Buffer Pool Management**
- Experimental Results
- Conclusion



# Buffer Pool Management

---

## Basic concepts

- Redundant index of buffer pool
- Static and dynamic page ratings

# Buffer Pool Management

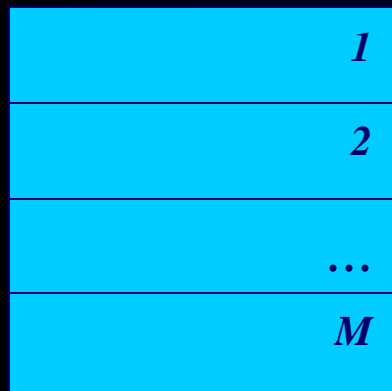
---

## Basic concepts

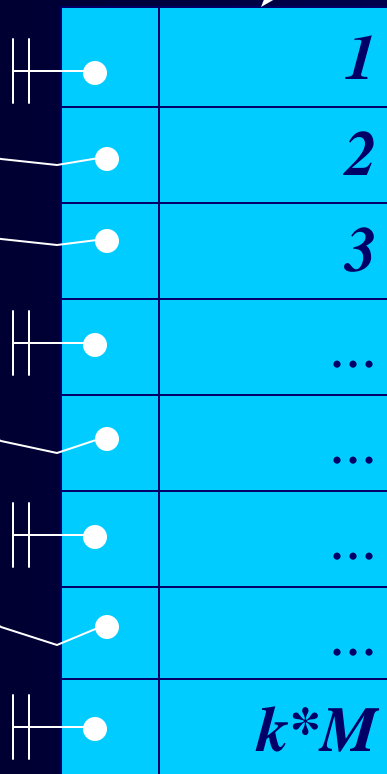
- **Redundant index of buffer pool**
- Static and dynamic page ratings

# Redundant Index of Buffer Pool (DIR)

**Buffer Pool**



**DIR**



**Page statistics**

<i>Attr</i>	<i>Semantic</i>
<i>HC</i>	Hit counter
<i>FC</i>	Fault counter
<i>HT</i>	Recent hit time
<i>FT</i>	Recent fault time
...	...

# Buffer Pool Management

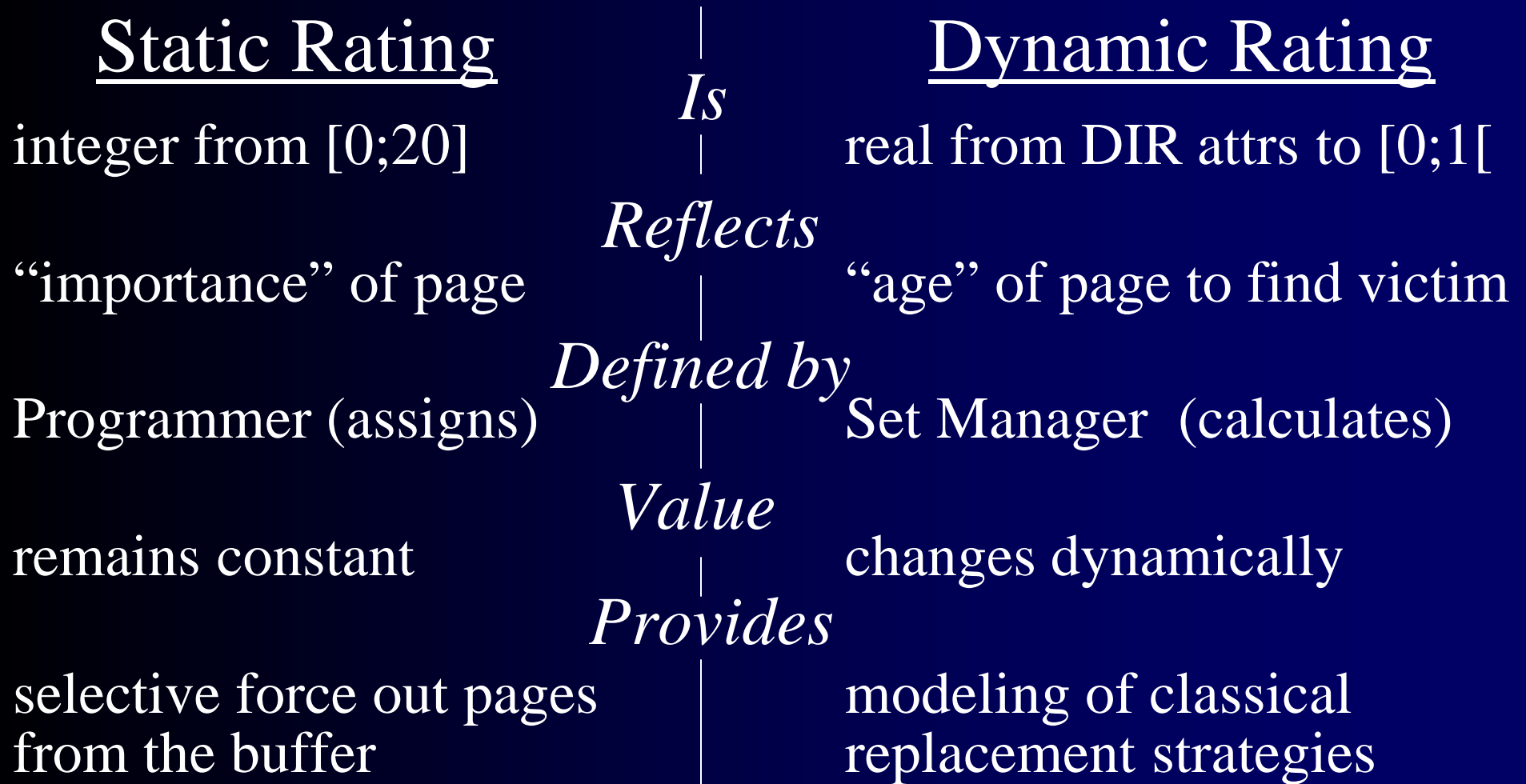
---

## Basic concepts

- Redundant index of buffer pool
- **Static and dynamic page ratings**

# Static and Dynamic Page Ratings

---



## Finding a Victim Using Ratings

---

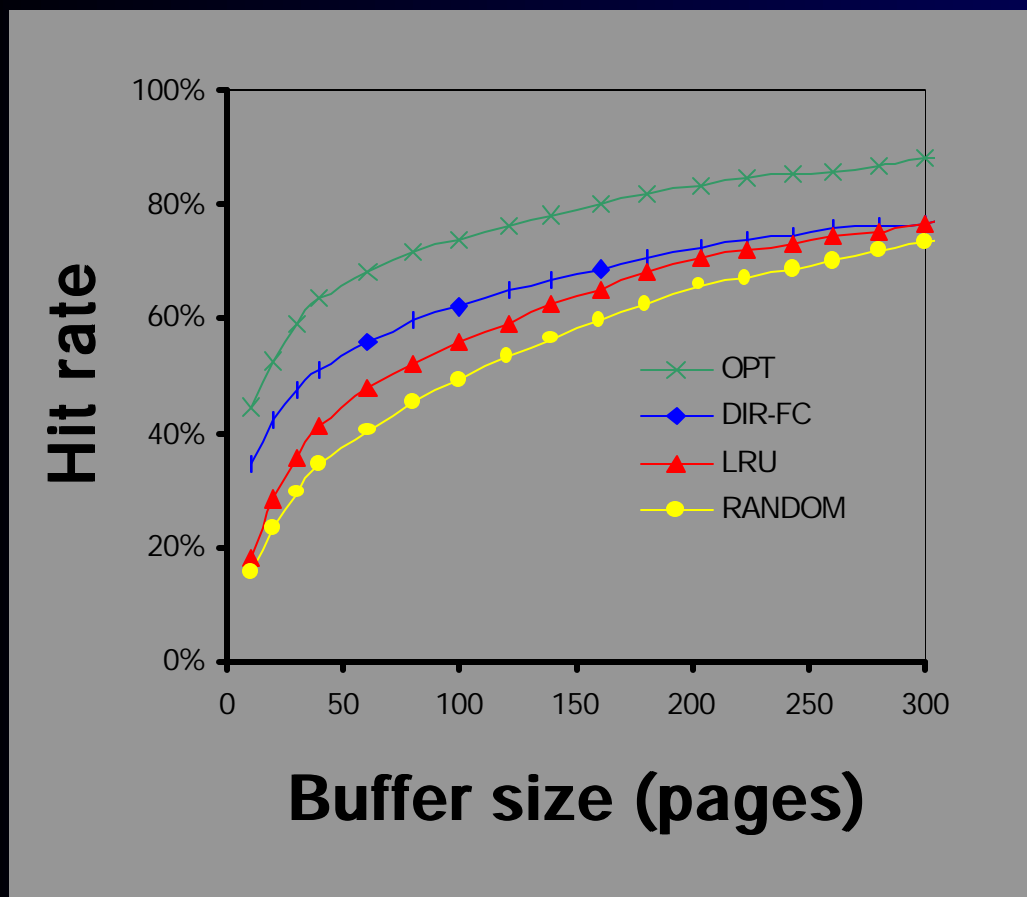
- Summary rating = Static + Dynamic
- Victim is page with minimal Summary rating
- If there are several such pages then victim is page that haven't been used for the longest time

# Contents

---

- Omega Project
- Omega File Management System
- Buffer Pool Management
- **Experimental Results**
- Conclusion

# Experimental Results (I)



## LRU vs $DIR_{FC}$

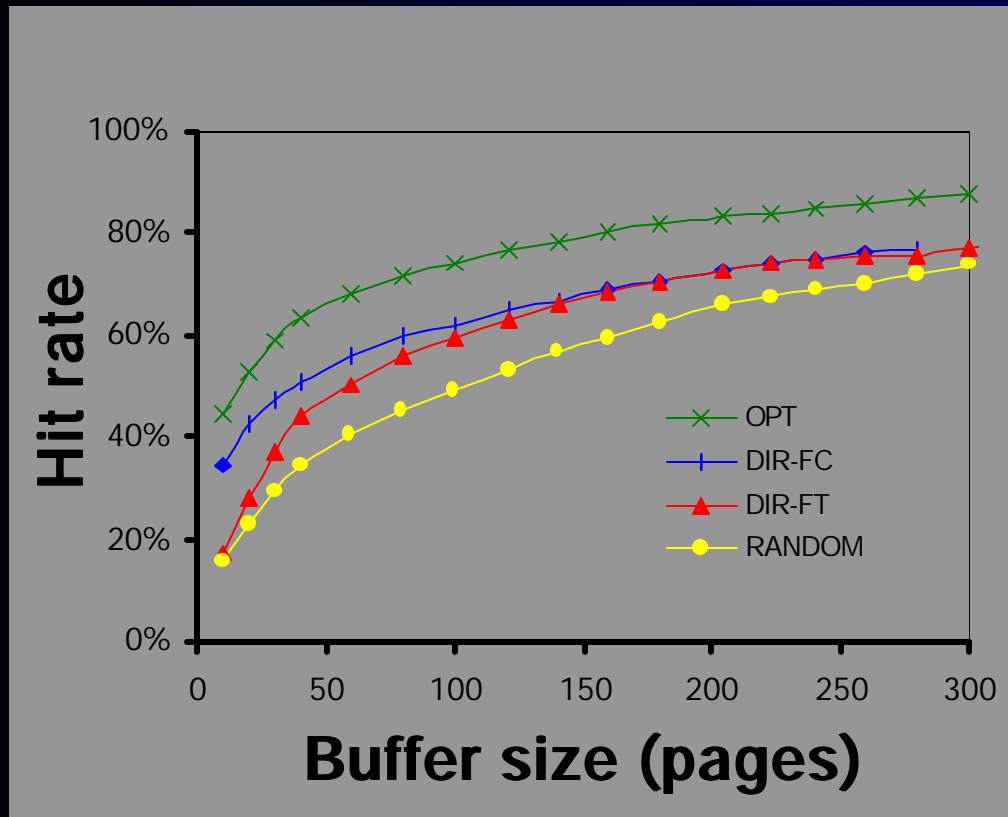
Strategy    Dynamic Rating

LRU            *NORM(HT)*

$DIR_{FC}$         *NORM(HC+FC/k)*



# Experimental Results (II)



## $DIR_{FT}$ vs $DIR_{FC}$

Strategy    Dynamic Rating

$DIR_{FC}$      $NORM(HC+FC/k)$

$DIR_{FT}$      $NORM(HT+FT/k)$

# Contents

---

- Omega Project
- Omega File Management System
- Buffer Pool Management
- Experimental Results
- **Conclusion**

# Conclusion

---

We have presented:

- structure of  $\Omega$ -File Management System
- buffer pool management principles based on
  - redundant index of buffer pool
  - static and dynamic page ratings
- results of numeric experiments.

# Thanks a lot for your attention

---

- Questions?
- Comments?

Mikhail L. Zymbler, Leonid B. Sokolinsky

Chelyabinsk State University, Russia

mzym@csu.ru, sokolinsky@acm.org

<http://www.csu.ru/~mzym>

<http://www.csu.ru/~sok>