**Excerpt (Russinovich, *Windows Internals*, p. 137)**

**Windows® Internals: Covering Windows Server® 2008 and Windows Vista**

**Ecerpt (Russinovich, *Windows Internals*, p. 137)**

**Windows® Internals: Covering Windows Server® 2008 and Windows Vista**

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**Assignmnent 1: Please translate the following excerpt into Serbian.**

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**Executive Objects**

Each Windows environment subsystem presents a different view of the operating system. Executive objects and services act as low-level primitives used by subsystems to construct their own objects and resources.

Executive objects are typically created either by an environment subsystem on behalf of a user application or by operating system components during normal operation. For example, when a Windows application creates a file, it calls **CreateFile** in *Kernel32.dll*, which ultimately invokes the native service **NtCreateFile** to create an executive file object.

Different subsystems may expose different sets of objects. The Windows subsystem maps many of its features directly onto executive objects (for example, mutexes and semaphores). It also builds higher-level abstractions such as named pipes and mailslots on top of executive file objects.

Other subsystems, such as POSIX, do not expose objects directly. Instead, they use executive objects internally to implement POSIX-style processes, pipes, and other resources.

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**Primary Executive Object Types**

Below is a simplified list of key executive objects exposed to the Windows API:

- **Process** – Represents a running program, including its virtual address space.
- **Thread** – The basic unit of execution within a process.
- **Job** – A group of processes managed as a single unit.
- **Section** – Shared memory region (file mapping).
- **File** – An opened file or I/O device.
- **Token** – Security profile of a process or thread.
- **Event** – Synchronization object with signaled/non-signaled state.
- **Semaphore** – Controls access to a limited number of resources.

- **Mutex** – Ensures exclusive access to a resource.
- **Timer** – Signals after a time interval.
- **IoCompletion (I/O Completion Port)** – Manages asynchronous I/O completion notifications.
- **Key** – Represents registry data within the object manager namespace.
- **Directory** – Virtual container in the object manager namespace.
- **TpWorkerFactory** – Manages thread pools and worker threads.

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**Kernel Transaction Manager Objects**

Used for transactional operations:

- **TmRm (Resource Manager)**
- **TmTx (Transaction)**
- **TmTm (Transaction Manager)**
- **TmEn (Enlistment)**

These support the Kernel Transaction Manager (KTM) and are created via APIs such as:

- CreateTransactionManager
- CreateResourceManager
- CreateTransaction
- CreateEnlistment

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**Additional Objects**

- **WindowStation** – Contains desktops, clipboard, and global atoms.
- **Desktop** – Logical display and windowing environment within a window station.

Assignment 2:

**Intermediate Value Property (clean notes format)**

*(Jonathan Kane – Writing Proofs in Analysis, 2006, p. 129, Section 4.7.3)*

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**Instruction**

Please translate the following excerpt into English.

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**Intermediate Value Property**

Suppose a function f is defined on an interval containing c and d.

The graph of f passes through:

- (c, f(c))
- (d, f(d))

It may happen that the graph passes through every value y between f(c) and f(d) as x moves from c to d.

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**Example**

Let:

f(x) = 2x^2 − 3

Then:

- f(1) = −1
- f(2) = 5

For any y between −1 and 5:

x = sqrt((y + 3)/2)

Then:

- x is between 1 and 2
- f(x) = y

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**Definition (Intermediate Value Property)**

A function f defined on an interval [a, b] has the intermediate value property if:

For all c, d such that:

- $a \leq c \leq d \leq b$

and for every y between:

- f(c) and f(d)

there exists x in [c, d] such that:

f(x) = y

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**Intermediate Value Theorem**

If a function is continuous on [a, b], then it has the intermediate value property on that interval.

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**Intuition**

If f is continuous on [a, b], meaning the graph can be drawn without lifting the pencil, then the function must pass through every intermediate y-value between f(c) and f(d).

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**Proof Idea**

Let:

- f continuous on [a, b]
- c, d ∈ [a, b]
- y between f(c) and f(d)

Goal:
Find x ∈ [c, d] such that f(x) = y

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**Construction**

Assume:
f(c) < y < f(d)

Define set:

S = { x ∈ [c, d] | f(x) ≤ y }

Then:

- c ∈ S → S is not empty
- d is an upper bound of S

So S has a least upper bound:

s = sup S

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**Key argument**

If f(s) < y:

- continuity ⇒ values near s still < y
- contradicts that s is an upper bound

If f(s) > y:

- continuity ⇒ values near s still > y
- contradicts that s is least upper bound

Therefore:

f(s) = y

So:
x = s

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**Other cases**

- If f(c) > f(d): same argument with reversed inequalities
- If f(c) = f(d): trivial case, x = c

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**Conclusion**

Without loss of generality, the proof assumes:

f(c) < f(d)

All other cases follow similarly.

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**Formal Source Note**

This is an excerpt adapted from:

Jonathan Kane,
*Writing Proofs in Analysis*,
Springer, 2006,
Section 4.7.3: The Intermediate Value Property,
p. 129.

Assignment 3: GETTING TO KNOW YOU

*(David Marusek – Getting to Know You, 2007, p. 114)*

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Instruction

Please translate the following excerpt into English.

Excerpt

Zoranna sighed. What do you need to know?
Shall Bug reprogram itself to enable Bug to process the file as requested?
No, Bug, I don't have the time to reprogram you, even if I knew how.
Shall Bug reprogram itself?
It could reprogram itself? Ted had failed to mention that feature. A tool they'd forgotten to disable? Yes, Bug, reprogram yourself.

A handicapped icon blinked on the cornice display, and the elevator's speed slowed to a crawl.

Thank you, Bug. That's more like it.

A jerry standing in the corner of the crowded elevator said, "Oh, lift?"
"Lift speed may not exceed five floors per minute," the elevator replied.

The jerry rose on tiptoes and surveyed his fellow passengers. "Right," he said, "who's the gimp?"
Everyone looked at their neighbors. There were michelles, jennies, a pair of jeromes, and a half-dozen other germlines. They all looked at Zoranna, the only person not dressed in AP brown and teal.

"I'm sorry," she said, pressing her palm to her temple, "I have an aneurysm the size of a grapefruit. The slightest strain . . ." She winced theatrically.

"Then have it fixed!" the jerry said, to murmured agreement.

"Gladly," said Zoranna. "Could you pony me the OE23,000?"

The jerry har-harred and looked her up and down appraisingly. "Sweetheart, if you spent half as much money on the vitals as you obviously do on the peripherals," he leered, "you wouldn't have this problem, now would you?"

Zoranna had never liked the jerry type; they were spooky. In fact, more jerries had to be pithed in vatero for incipient sociopathy than any other commercial type. Professionally, they made superb grunts; most of the indentured men in the Protectorate's commando forces were jerries. This one, however, wore an EXTRUSIONS UNLIMITED patch on his teal ball cap; he was security for a retail mall. "So," he said, "where you heading?"

"Sub40?" she said.

Passengers consulted the cornice display and groaned. The jerry said, "At this rate it'll take me an hour to get home."

"Again I apologize," said Zoranna, "but all the down lifts were spango. However, if everyone here consensed to drop me off first—?"

There was a general muttering as passengers spoke to their belts or tapped virtual keyboards, and the elevator said, "Consensus has been modified."

Formal Source Note

This is an excerpt from:

David Marusek,
*Getting to Know You*,
**2007,**
**p. 114.**