

Understanding COM

Presented by Mike Wolfe
of nolongerset.com

Who am I?

- MS Access / SQL Server developer since 2007 (15 years)
- Owner of Grandjean & Braverman, Inc. since 2016 (6 years)
- Top 15 all-time contributor to the [ms-access] tag at Stack Overflow
- Write daily articles on Access and VBA at **nolongerset.com**
- **Microsoft Access MVP** since November 2021



Outline

- What is COM and Why Do We Care?
- High-Level Overview
- Low-Level Details
- Practical Applications
- Permalink to Resources (on last slide)

What is COM and Why Do We Care?

- Why was COM needed?
- COM is a “Binary Interface Standard”
- The Law of Leaky Abstractions

High-Level Overview

- COM Client vs. COM Server
- COM Server Types
 - **In-process:** part of msaccess.exe
 - **Local:** standalone process (e.g., excel.exe)
 - **Remote:** process on another device

High-Level Overview

- COM is Like a Chinese Restaurant
- Early Binding
 - “I’ll have a #8.”
- Late Binding
 - “I’ll have the Spicy Wontons.”

| | | APPETIZERS | |
|---|-----|-------------------|--|
| 春 | 卷 | 1. | Egg Roll (each)..... 1.25 |
| 蝦 | 卷 | 2. | Shrimp Roll (each)..... 1.50 |
| 炸 | 卷 | 3. | Fried Wonton (10)..... 3.50 |
| 鍋 | 雲 | 4. | Fried or Steamed Dumplings (6) 4.95 |
| 貼 | • 水 | 5. | Crab Rangoon (6)..... 4.95 |
| 炸 | 龍 | 6. | Steak or Chicken Teriyaki (4)..... 6.75 |
| 牛 | 肉 | 7. | Shrimp Toast (4)..... 4.95 |
| 蝦 | 吐 | 8. ☞ | Spicy Wonton (8 pcs) 4.50 |
| 四 | 川 | 9. | B-B-Q Spare Ribs..... (S) 6.50 (L) 12.95 |
| 排 | 饅 | 10. | Boneless Spare Ribs..... 9.95 |
| 無 | 骨 | 11. | Pao Pao Combination (Serves 2) ... 12.50 |
| 寶 | 寶 | | Includes: Egg Roll, Crab Rangoon, Fried Wonton, Steak Teriyaki, B-B-Q Ribs, Shrimp Toast. |

Memory Management in COM

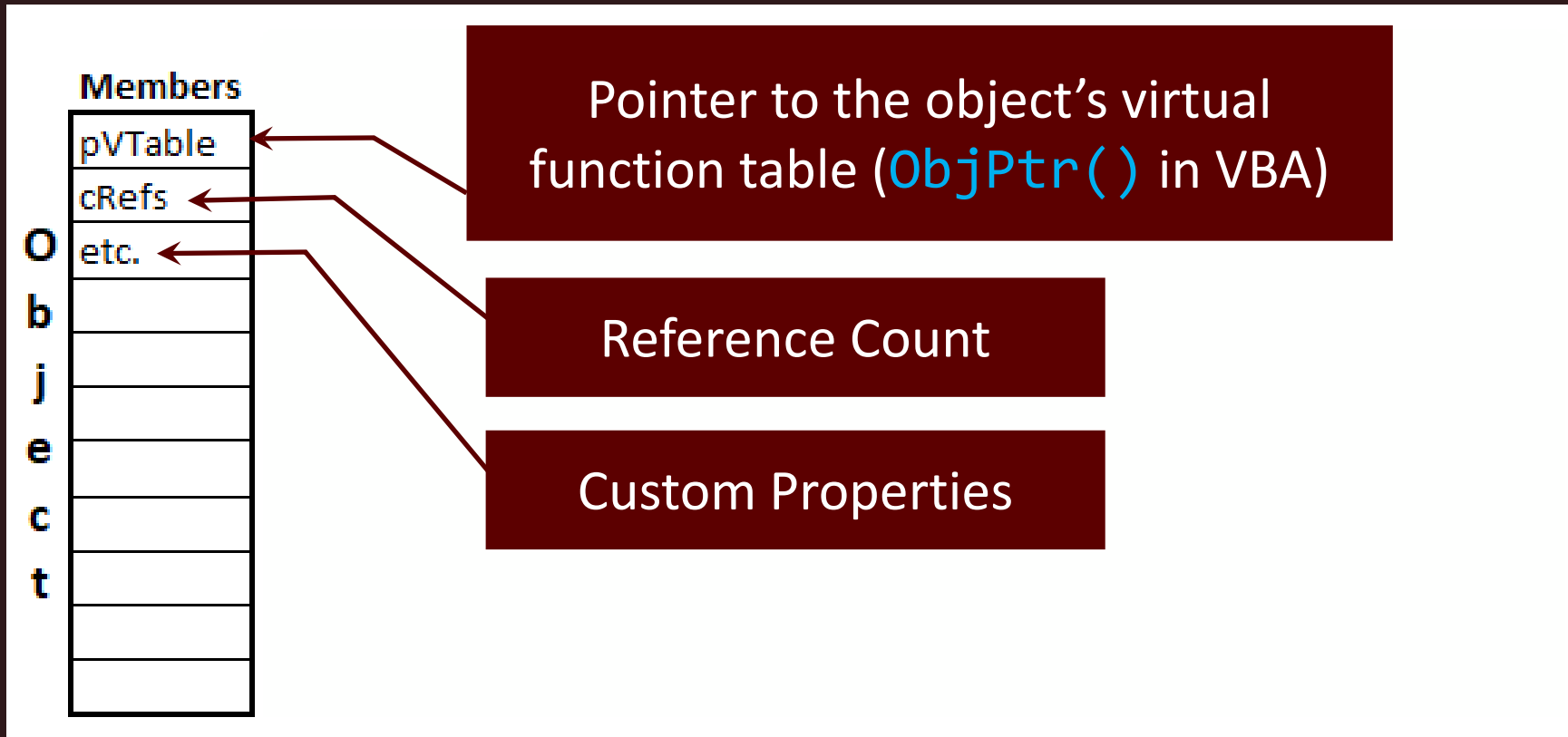
- The *COM and Get It!* Diner
- Reference Counting with **Wink Nuno**
 - Tell Wink when you arrive
 - Tell Wink when you leave
 - The diner closes when everyone leaves



Low-Level Details

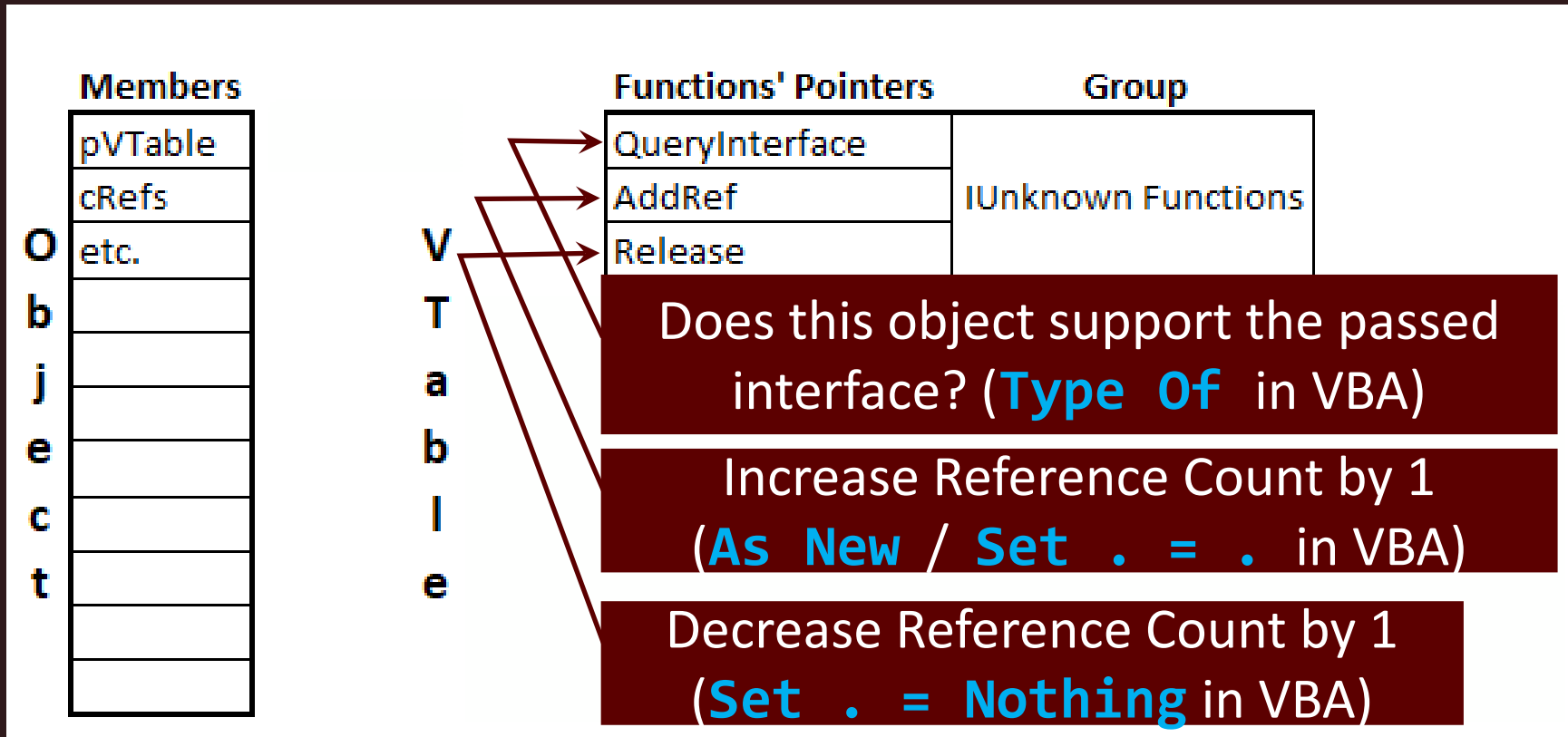
- Key Interfaces
 - **IUnknown**: Object Management
 - **IDispatch**: Methods, Functions, Properties
- Type Libraries
- Virtual Function Table

Virtual Function Table (VTable)



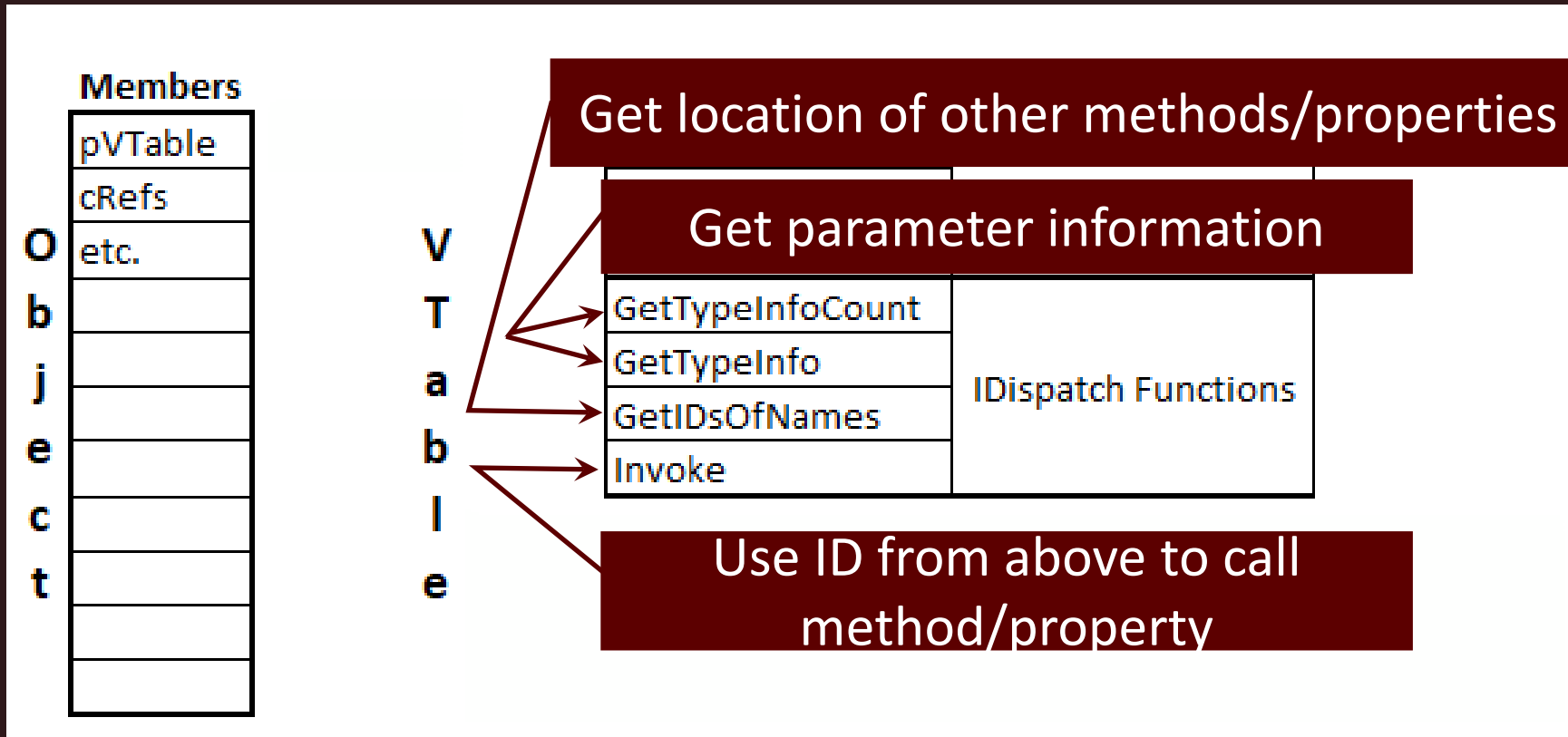
Source: *Advanced Visual Basic 6*, by Matthew Curland (p. 54)

Virtual Function Table (VTable)



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Virtual Function Table (VTable)



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Virtual Function Table (VTable)

| Members | RPC opnum | Functions' Pointers | Group | byte offset | |
|---------|--------------|---------------------|---------------------|-------------|--------|
| | | | | 32-bit | 64-bit |
| pVTable | 0 | QueryInterface | IUnknown Functions | 0 | 0 |
| cRefs | 1 | AddRef | | 4 | 8 |
| etc. | 2 | Release | | 8 | 16 |
| | 3 | GetTypeInfoCount | IDispatch Functions | 12 | 24 |
| | 4 | GetTypeInfo | | 16 | 32 |
| | 5 | GetIDsOfNames | | 20 | 40 |
| | 6 | Invoke | | 24 | 48 |
| | 7 | FirstMethod | Custom Functions | 28 | 56 |
| | 8 | SecondMethod | | 32 | 64 |
| | 9 | ThirdMethod | | 36 | 72 |
| | | etc. | | 40 | 80 |

Source: *Advanced Visual Basic 6*, by Matthew Curland (p. 54)

Low-Level Details

- Memory Management
 - **COM**: Reference Counting
 - **.NET**: Garbage Collection
- Strong vs. Weak References

Practical Applications

- Early binding
- Late binding
- Excel, Word, Outlook automation
- Building COM Servers with twinBASIC

Deployment Considerations

- Does it exist on the user's computer?
- Calling regsvr32 (Inno Setup, .bat file)
- Embedding .dll's (Inno Setup)
- Sample: Access 2013 .dbf Support

Questions?

Links and Resources:

<https://nolongerset.com/understanding-com/>