CLEAN CODE: REFACTORING

PRESENTED BY

JEFF CAROUTH
@jcarouth

PROGRAMMING IS HARD

WHY IS PROGRAMMING DIFFICULT?

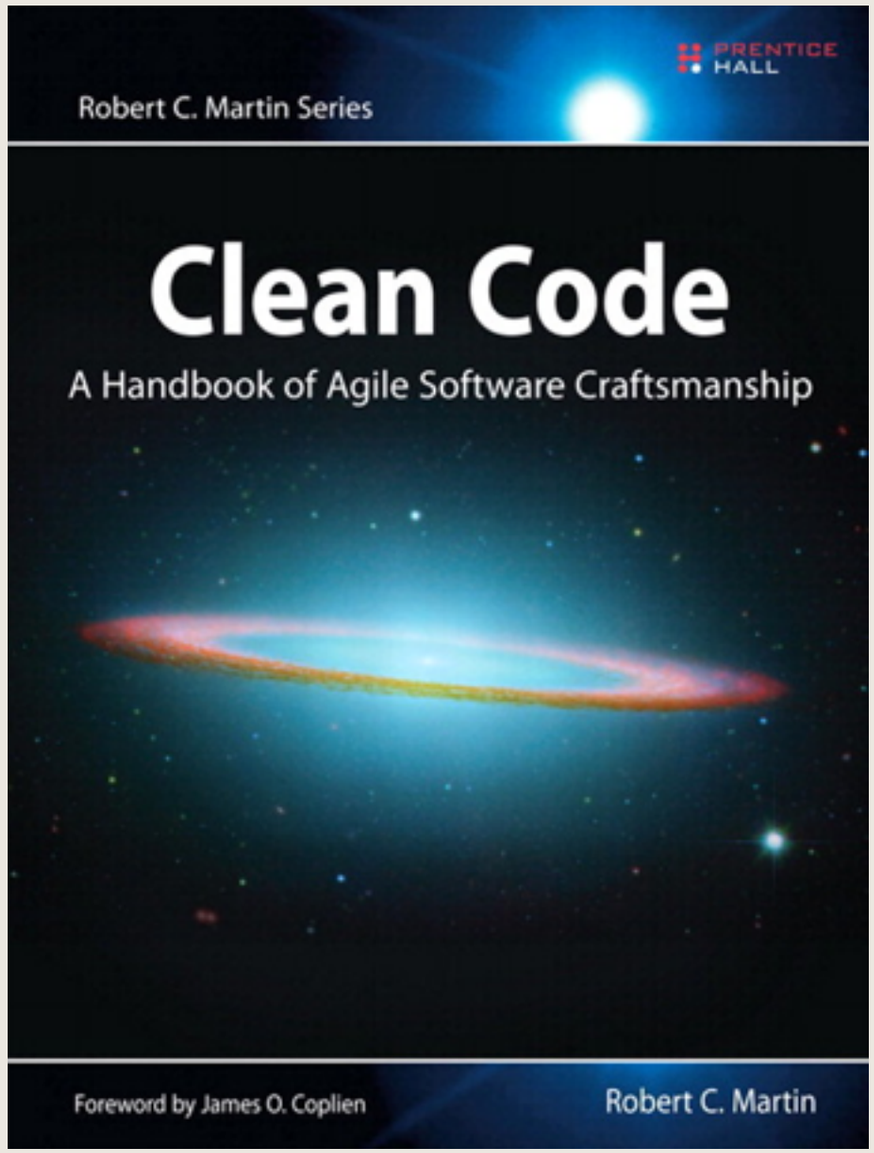
ARE YOU A COMPILER?

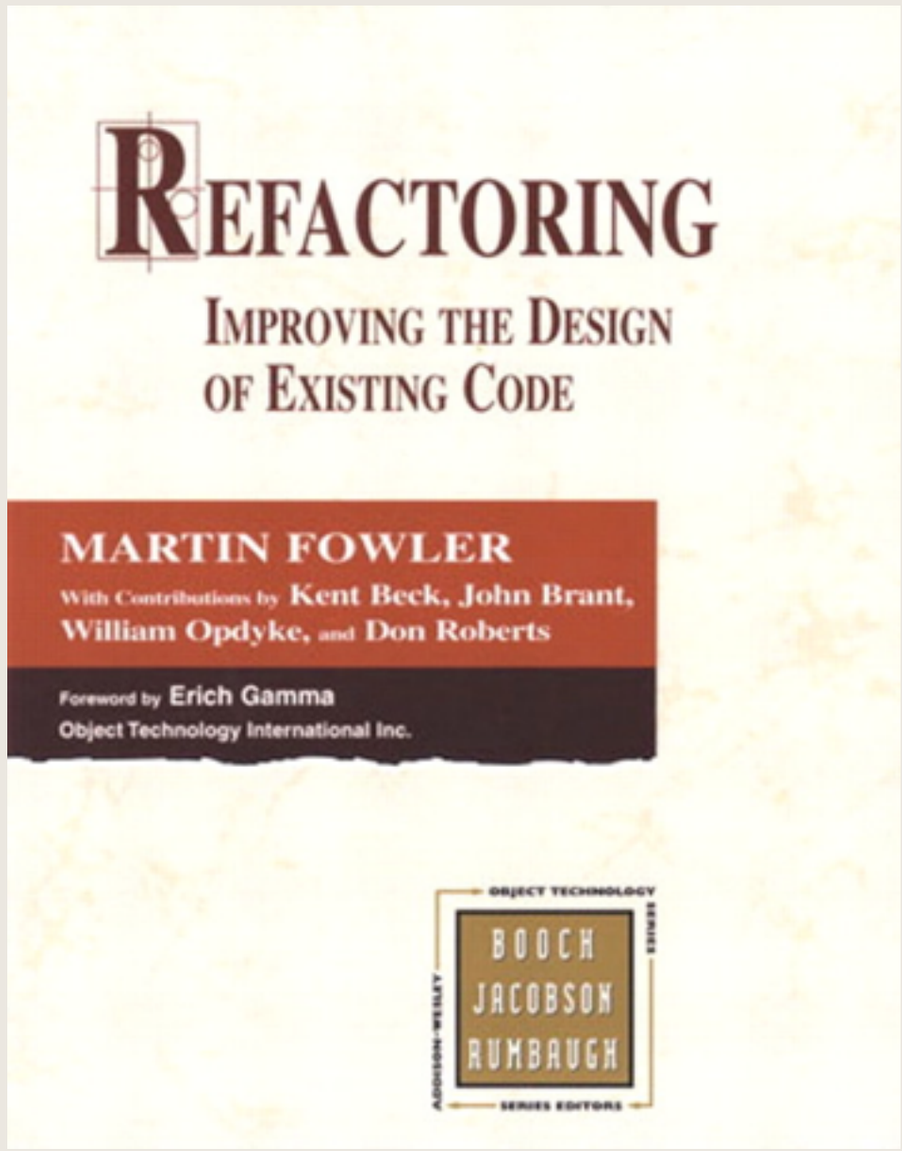
“ANY FOOL CAN WRITE CODE A COMPUTER CAN UNDERSTAND.”

“GOOD PROGRAMMERS WRITE CODE HUMANS CAN UNDERSTAND.”

– MARTIN FOWLER

READ THESE BOOKS





CLEAN CODE

Clean code is readable; it tells a story.

Clean code is cared for;
it is maintained.

Clean code is efficient; it is done right.

Clean code is extensible;
it is able to solve
tomorrow's problems.

Clean code is simple;
it is easy to understand
how it works and
what it does.

THE TWO RULES OF CLEAN CODE

RULE #1

Write dirty code, then clean it.

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Write dirty code, then clean it.

> You cannot write clean code at first.

> Your first pass at solving a problem will not be your best.

> Successive refinement through refactoring is the key to clean code.

RULE #2

Leave the code cleaner than you found it.

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> Incremental changes are the way to go.

RULE #2

Leave the code cleaner than you found it.

> Shamelessly borrowed from the Boy Scouts of America.

> Incremental changes are the way to go.

> Even if the only change you make is cosmetic, you are maintaining clean code.

AN EXAMPLE

```php
class AccountService
{
    public function find($id)
    {
        if (is_string($id) && strlen($id) == 36) {
            $statement = $this->db->prepare(
                "SELECT * FROM accounts WHERE id = :account_id"
            );
            $statement->execute(['account_id' => $id]);

            if ($statement->rowCount() == 1) {
                $data = $statement->fetch();

                $account = new Account();
                $account->setId($data['id']);
                $account->setName($data['name']);

                return $account;
            } else {
                return null;
            }
        } else {
            throw new \InvalidArgumentException('ID is not valid');
        }
    }
}
```

```php
class AccountService
{
    public function find($id)
    {
        if (is_string($id) && strlen($id) == 36) {
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                return $account;
            } else {
                return null;
            }
        } else {
            throw new \InvalidArgumentException('ID is not valid');
        }
    }
}
```

REFACTORING

When you have a significant number of nested conditionals, you can refactor them to be more understandable using guard clauses.

```php
class AccountService
{
    public function find($id)
    {
        if (is_string($id) && strlen($id) == 36) {
            $statement = $this->db->prepare(
                "SELECT * FROM accounts WHERE id = :account_id"
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                $account->setId($data['id']);
                $account->setName($data['name']);

                return $account;
            } else {
                return null;
            }
        } else {
            throw new \InvalidArgumentException('ID is not valid');
        }
    }
}
```

```php
class AccountService
{
    public function find($id)
    {
        if (!is_string($id) || strlen($id) != 36) {
            throw new \InvalidArgumentException('Account ID is not valid');
        }

        $statement = $this->db->prepare(
            "SELECT * FROM accounts WHERE id = :account_id"
        );
        $statement->execute(['account_id' => $id]);

        if ($statement->rowCount() == 1) {
            $data = $statement->fetch();

            $account = new Account();
            $account->setId($data['id']);
            $account->setName($data['name']);

            return $account;
        } else {
            return null;
        }
    }
}
```

REFACTORING

Complicated or boolean expressions using magic numbers or otherwise non-obvious logic should be refactored to a descriptively named helper method.

```php
class AccountService
{
    public function find($id)
    {
        if (!$this->isValidId($id)) {
            throw new \InvalidArgumentException('Account ID is not valid');
        }

        //snip – my favorite slide-only refactoring
    }

    private function isValidId($id)
    {
        return is_string($id) && strlen($id) == 36;
    }
}
```

```php
public function find($id)
{
    if (!$this->isValidId($id)) {
        throw new \InvalidArgumentException('Account ID is not valid');
    }

    $statement = $this->db->prepare(
        "SELECT * FROM accounts WHERE id = :account_id"
    );
    $statement->execute(['account_id' => $id]);

    if ($statement->rowCount() == 1) {
        $data = $statement->fetch();

        $account = new Account();
        $account->setId($data['id']);
        $account->setName($data['name']);

        return $account;
    } else {
        return null;
    }
}
```

REFACTORING

Extract what could be common functionality, or even functionality that belongs on a different object into methods.

```php
private function fetchAccountDataById($id)
{
    $statement = $this->db->prepare(
        "SELECT * FROM accounts WHERE id = :account_id"
    );
    $statement->execute(['account_id' => $id]);

    if ($statement->rowCount() == 1) {
        $data = $statement->fetch();
    } else {
        $data = array();
    }

    return $data;
}
```

```php
class AccountService
{
    public function find($id)
    {
        if (!$this->isValidId($id)) {
            throw new \InvalidArgumentException('Account ID is not valid');
        }

        $data = $this->fetchAccountDataById($id);

        if (empty($data)) {
            return null;
        }

        $account = new Account();
        $account->setId($data['id']);
        $account->setName($data['name']);

        return $account;
    }

    private function fetchAccountDataById($id)
    {
        //snip – slides are not very tall
    }
}
```

```php
class AccountService
{
    public function find($id)
    {
        if (!$this->isValidId($id)) {
            throw new \InvalidArgumentException('Account ID is not valid');
        }

        $data = $this->fetchAccountDataById($id);

        if (empty($data)) {
            return null;
        }

        $account = new Account();
        $account->setId($data['id']);
        $account->setName($data['name']);

        return $account;
    }
}
```

```php
class AccountService
{
    public function find($id)
    {
        if (!$this->isValidId($id)) {
            throw new \InvalidArgumentException('Account ID is not valid');
        }

        $data = $this->fetchAccountDataById($id);

        return $this->buildAccountFromData($data);
    }

    private function buildAccountFromData($data)
    {
        if (empty($data)) {
            return null;
        }

        $account = new Account();
        $account->setId($data['id']);
        $account->setName($data['name']);

        return $account;
    }

    // snip
}
```

REFACTORING

Replace instances of returning `null` in place of an object with returning instances of a `NullObject` where possible and appropriate.

```php
$accountService = new AccountService(new MyPdoWrapper(...));

$account = $accountService->fetch('...');

if (null === $account) {
    //bail. we don't have a valid account

}

if (!$account->isActive()) {
    //error the account is not active
}
```

```php
class NullAccount extends Account
{
    public function isActive()
    {
        return false;
    }
}
```

```php
class AccountService
{
    public function find($id)
    {
        if (!$this->isValidId($id)) {
            throw new \InvalidArgumentException('Account ID is not valid');
        }

        $data = $this->fetchAccountDataById($id);

        return $this->buildAccountFromData($data);
    }

    private function buildAccountFromData($data)
    {
        if (empty($data)) {
            return new NullAccount();
        }

        $account = new Account();
        $account->setId($data['id']);
        $account->setName($data['name']);

        return $account;
    }

    // snip
}
```

REFACTORING

Extract methods or logic into classes when the code isn't necessarily relevant to the object you are working in.

```php
class AccountService
{
    // snip

    private function fetchAccountDataById($id)
    {
        $statement = $this->db->prepare(
            "SELECT * FROM accounts WHERE id = :account_id"
        );
        $statement->execute(['account_id' => $id]);

        if ($statement->rowCount() == 1) {
            $data = $statement->fetch();
        } else {
            $data = array();
        }

        return $data;
    }

    // snip
}
```

```php
class AccountDataProvider
{
    public function __construct(PDO $pdo)
    {
        $this->dbh = $pdo;
    }

    public function fetchById($id)
    {
        $statement = $this->db->prepare(
            "SELECT * FROM accounts WHERE id = :account_id"
        );
        $statement->execute(['account_id' => $id]);

        if ($statement->rowCount() == 1) {
            $data = $statement->fetch();
        } else {
            $data = array();
        }

        return $data;
    }
}
```

```php
class AccountService
{
    // snip

    public function find($id)
    {
        if (!$this->isValidId($id)) {
            throw new \InvalidArgumentException('Account ID is not valid');
        }

        $data = $this->provider->fetchById($id);

        return $this->buildAccountFromData($data);
    }

    // snip
}
```

```php
$accountService = new AccountService(new AccountDataProvider($pdo));
$account = $accountService->fetch('...');

if (!$account->isActive()) {
    //error the account is not active
}
```

WHICH IS MORE READABLE?

```php
class AccountService
{
    public function find($id)
    {
        if (isset($id) && strlen($id) == 36) {
            $statement = $this->db->prepare(
                "SELECT * FROM accounts WHERE id = :account_id"
            );
            $statement->execute(['account_id' => $id]);

            if ($statement->rowCount() == 1) {
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{
    public function find($id)
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        if (!$this->isValidId($id)) {
            throw new \InvalidArgumentException('Account ID is not valid');
        }

        $data = $this->provider->fetchById($id);

        return $this->buildAccountFromData($data);
    }

    // snip
}
```

TWO EXAMPLES ARE BETTER THAN ONE

```php
class Product
{
    public function createUrl($store, $isMobile = false, $includeDomain = true)
    {
        $url = "";

        if (!$store->isDefault()) {
            $trySSL = false;
            $forceToCore = false;

            if ($this->featureToggle) {
                if ($includeDomain) {
                    $url .= $this->config->secureProtocol.$this->config->storeDomainName;
                }
                $url .= "/checkout?product_id=".$this->productId;
                if ($this->isDated()) {
                    $url .= "&date=".date("Y-m-d", strtotime($this->date));
                }
            } else {
                if ($includeDomain) {
                    $url .= $store->GetFullUrl($trySSL, $isMobile);
                }
                $url .= "/resort_detail.php?ProductId=".$this->productId;
                if ($this->isDated()) {
                    $url .= "&StartDate=".date("Y-m-d", strtotime($this->date));
                }
            }
        } else {
            $domainName = $this->config->domainName;
            if (!$domainName) {
                $domainName = $this->config->desktopDomainName;
            }
            if ($this->featureToggle) {
                if ($includeDomain) {
                    $url .= $this->config->secureProtocol.$domainName;
                }
                $url .= "/checkout?product_id=".$this->productId;
                if ($this->isDated()) {
                    $url .= "&date=".date("Y-m-d", strtotime($this->date));
                }
            } else {
                if ($includeDomain) {
                    $url .= "http://".$domainName;
                }
                $url .= "/resort_detail.php?ProductId=".$this->productId;
                if ($this->isDated()) {
                    $url .= "&StartDate=".date("Y-m-d", strtotime($this->date));
                }
            }
        }
    }
}
```

```
{
    $url = "";

    if (!$store->isDefault()) {
        $trySSL = false;
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        if ($this->featureToggle) {
            if ($includeDomain) {
                $url .= $this->config->secureProtocol.$this->config->sto
            }
            $url .= "/checkout?product_id=".$this->productId;
            if ($this->isDated()) {
                $url .= "&date=".date("Y-m-d", strtotime($this->date));
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            }
        }
    } else {
        $domainName = $this->config->domainName;
        if (!$domainName) {
            $domainName = $this->config->desktopDomainName;
        }
        if ($this->featureToggle) {
```

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                $url .= "&StartDate=".date("Y-m-d", strtotime($this->date
            }
        }
    } else {
        $domainName = $this->config->domainName;
        if (!$domainName) {
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        }
    }
}
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            }
        } else {
            if ($includeDomain) {
                $url .= $store->GetFullUrl($trySSL, $isMobile);
            }
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            }
        }
    } else {
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        if (!$domainName) {
            $domainName = $this->config->desktopDomainName;
        }
        if ($this->featureToggle) {
```

```
class Product
{
    public function createUrl($store, $isMobile = false, $includeDomain = tru
    {
        $url = "";

        if ($includeDomain) {
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                }

                if ($this->featureToggle) {
                    $url .= $this->config->secureProtocol.$domainName;
                } else {
                    $url .= "http://".$domainName;
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            } else {
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class Product
{
    public function createUrl($store, $isMobile = false, $includeDomain = tru
    {
        $url = "";
        $protocol = $this->config->secureProtocol;

        if ($includeDomain) {
            if ($store->isDefault()) {

                $domainName = $this->config->domainName;
                if (!$domainName) {
                    $domainName = $this->config->desktopDomainName;
                }

                if ($this->featureToggle) {
                    $url .= $protocol.$domainName;
                } else {
                    $url .= "http://".$domainName;
                }
            } else {
                if ($this->featureToggle) {
                    $url .= $protocol.$this->config->storeDomainName;
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                }
            }

            if ($store->isDefault()) {
                if (!$this->featureToggle) {
                    $protocol = "http://";
                }

                $url .= $protocol.$domainName;
            } else {
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                }
            }
        }

        if ($store->isDefault() && !$this->featureToggle) {
            $protocol = "http://";
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        $url .= $protocol.$domainName;

        if (!$store->isDefault()) {
            if ($this->featureToggle) {
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            } else {
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$protocol = $this->config->secureProtocol;

if ($includeDomain) {
    $domainName = $this->config->storeDomainName;

    if ($store->isDefault()) {
        $domainName = $this->config->domainName;
        if (!$domainName) {
            $domainName = $this->config->desktopDomainName;
        }
    }

    if ($store->isDefault() && !$this->featureToggle) {
        $protocol = "http://";
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    $url .= $protocol.$domainName;

    if (!$store->isDefault()) {
        if ($this->featureToggle) {
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            $url .= $store->GetFullUrl($trySSL, $isMobile);
        }
    }
}

if (!$store->isDefault()) {
    $trySSL = false;
```

```
$protocol = $this->config->secureProtocol;

if ($includeDomain) {
    $domainName = $this->config->storeDomainName;

    if ($store->isDefault()) {
        $domainName = $this->config->domainName;
        if (!$domainName) {
            $domainName = $this->config->desktopDomainName;
        }
    }

    if ($store->isDefault() && !$this->featureToggle) {
        $protocol = "http://";
    }

    $url .= $protocol.$domainName;

    if (!$store->isDefault()) {
        if (!$this->featureToggle) {
            $url .= $store->GetFullUrl($trySSL, $isMobile);
        }
    }
}

if (!$store->isDefault()) {
    $trySSL = false;
    $forceToCore = false;
```

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if ($includeDomain) {
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    if ($store->isDefault()) {
        $domainName = $this->config->domainName;
        if (!$domainName) {
            $domainName = $this->config->desktopDomainName;
        }
    }

    if ($store->isDefault() && !$this->featureToggle) {
        $protocol = "http://";
    }

    $url .= $protocol.$domainName;

    if (!$store->isDefault() && !$this->featureToggle) {
        $trySSL = false;
        $url .= $store->GetFullUrl($trySSL, $isMobile);
    }
}

if (!$store->isDefault()) {
    if ($this->featureToggle) {
        $url .= "/checkout?product_id=".$this->productId;
        if ($this->isDated()) {
            $url .= "&date=".date("Y-m-d", strtotime($this->date));
```

```
        }

        if (!$store->isDefault()) {
            if ($this->featureToggle) {
                $url .= "/checkout?product_id=".$this->productId;
                if ($this->isDated()) {
                    $url .= "&date=".date("Y-m-d", strtotime($this->date));
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                $url .= "/product_detail.php?ProductId=".$this->productId;
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                $url .= "/product_detail.php?ProductId=".$this->productId;
                if ($this->isDated()) {
                    $url .= "&StartDate=".date("Y-m-d", strtotime($this->date
                }
            }
        }
    }
}
```

```
        }

        if ($this->featureToggle) {
            if (!$store->isDefault()) {
                $url .= "/checkout?product_id=".$this->productId;
                if ($this->isDated()) {
                    $url .= "&date=".date("Y-m-d", strtotime($this->date));
                }
            } else {
                $url .= "/checkout?product_id=".$this->productId;
                if ($this->isDated()) {
                    $url .= "&date=".date("Y-m-d", strtotime($this->date));
                }
            }
        } else {
            if (!$store->isDefault()) {
                $url .= "/resort_detail.php?ProductId=".$this->productId;
                if ($this->isDated()) {
                    $url .= "&StartDate=".date("Y-m-d", strtotime($this->date
                }
            } else {
                $url .= "/resort_detail.php?ProductId=".$this->productId;
                if ($this->isDated()) {
                    $url .= "&StartDate=".date("Y-m-d", strtotime($this->date
                }
            }

        }
    }
}
```

```
        }

        if ($this->featureToggle) {
            $url .= "/checkout?product_id=".$this->productId;
        } else {
            $url .= "/resort_detail.php?ProductId=".$this->productId;
        }

        if ($this->isDated) {
            $dateParam = $this->featureToggle ? "start_date" : "StartDate";
            $url = "&{$dateParam}=" . date("Y-m-d", strtotime($this->date));
        }
    }
}
```

```
class Product
{
    public function createUrl($store, $isMobile = false, $includeDomain = tru
    {
        $url = "";
        $protocol = $this->config->secureProtocol;

        if ($includeDomain) {
            $domainName = $this->config->storeDomainName;

            if ($store->isDefault()) {
                $domainName = $this->config->domainName;
                if (!$domainName) {
                    $domainName = $this->config->desktopDomainName;
                }
            }

            if ($store->isDefault() && !$this->featureToggle) {
                $protocol = "http://";
            }

            $url .= $protocol.$domainName;

            if (!$store->isDefault() && !$this->featureToggle) {
                $trySSL = false;
                $url .= $store->GetFullUrl($trySSL, $isMobile);
            }
        }
```

```php
class Product
{
    public function createUrl($store, $isMobile = false, $includeDomain = tru
    {
        $url = "";
        $protocol = $this->config->secureProtocol;

        if ($includeDomain) {
            $domainName = $this->getDomainNameForStore($store);

            // snip
        }

        // snip
    }

    private function getDomainNameForStore($store)
    {
        $domainName = $this->config->storeDomainName;

        if ($store->isDefault()) {
            $domainName = $this->config->domainName;
            if (!$domainName) {
                $domainName = $this->config->desktopDomainName;
            }
        }
    }
}
```

WHEW

```php
class Product
{
    public function createUrl($store, $isMobile = false, $includeDomain = true)
    {
        $url = "";

        if (!$store->isDefault()) {
            $trySSL = false;
            $forceToCore = false;

            if ($this->featureToggle) {
                if ($includeDomain) {
                    $url .= $this->config->secureProtocol.$this->config->storeDomainName;
                }
                $url .= "/checkout?product_id=".$this->productId;
                if ($this->isDated()) {
                    $url .= "&date=".date("Y-m-d", strtotime($this->date));
                }
            } else {
                if ($includeDomain) {
                    $url .= $store->GetFullUrl($trySSL, $isMobile);
                }
                $url .= "/resort_detail.php?ProductId=".$this->productId;
                if ($this->isDated()) {
                    $url .= "&StartDate=".date("Y-m-d", strtotime($this->date));
                }
            }
        } else {
            $domainName = $this->config->domainName;
            if (!$domainName) {
                $domainName = $this->config->desktopDomainName;
            }
            if ($this->featureToggle) {
                if ($includeDomain) {
                    $url .= $this->config->secureProtocol.$domainName;
                }
                $url .= "/checkout?product_id=".$this->productId;
                if ($this->isDated()) {
                    $url .= "&date=".date("Y-m-d", strtotime($this->date));
                }
            } else {
                if ($includeDomain) {
                    $url .= "http://".$domainName;
                }
                $url .= "/resort_detail.php?ProductId=".$this->productId;
                if ($this->isDated()) {
                    $url .= "&StartDate=".date("Y-m-d", strtotime($this->date));
                }
            }
        }
    }
}
```

```php
class Product
{
    public function createUrl($store, $isMobile = false, $includeDomain = true)
    {
        $url = "";
        $protocol = $this->config->secureProtocol;

        if ($includeDomain) {
            $domainName = $this->getDomainNameForStore($store);

            if ($store->isDefault() && !$this->featureToggle) {
                $protocol = "http://";
            }

            $url .= $protocol.$domainName;

            if (!$store->isDefault() && !$this->featureToggle) {
                $trySSL = false;
                $url .= $store->GetFullUrl($trySSL, $isMobile);
            }
        }

        if ($this->featureToggle) {
            $url .= "/checkout?product_id=".$this->productId;
        } else {
            $url .= "/product_detail.php?ProductId=".$this->productId;
        }

        if ($this->isDated) {
            $dateParam = $this->featureToggle ? "start_date" : "StartDate";
            $url = "&{$dateParam}=" . date("Y-m-d", strtotime($this->date));
        }
    }

    private function getDomainNameForStore($store)
```

RECAP

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Clean code is readable, cared for, efficient, extensible, and simple.

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Write dirty code and successively refine.