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--- 파일 경로: adapters/BaseAdapter.php ---

```php
<?php
namespace Flex\Banana\Adapters;

use Flex\Banana\Interfaces\BaseAdapterInterface;

class BaseAdapter implements BaseAdapterInterface{
    public const __version = '0.1';

    public function getVersion(): string
    {
        return static::__version;
    }
}
```

--- 파일 경로: adapters/DbAdapter.php ---

```php
<?php
namespace Flex\Banana\Adapters;

use Flex\Banana\Classes\Db\DbManager;
use Flex\Banana\Adapters\BaseAdapter;

class DbAdapter extends BaseAdapter{
    public function __construct(
        public DbManager $db
    ){}
}
```

--- 파일 경로: adapters/TaskDfToJsonAdapter.php ---

```php
<?php
namespace Flex\Banana\Adapters;

use DOMDocument;
use DOMXPath;
use Flex\Banana\Classes\TaskFlow;
use Flex\Banana\Classes\Log;

final class TaskDfToJsonAdapter
{
    public const __version = '0.1.0';
    public function __construct(
        private TaskFlow $task
    ) {}

    public function execute(array $posts): array
    {
        $result = [];
        $flow_json = json_decode($posts['contents'],true);
        // print_r($flow_json);
        foreach ($flow_json as $node) {
            if (!isset($node['data'])) continue;
            $result[] = $node['data'];
        }
        // print_r($result);

        $posts["flow"] = json_encode($result,JSON_UNESCAPED_UNICODE);
        return $posts;
    }
}
```

--- 파일 경로: adapters/TaskJsonAdapter.php ---

```php
<?php
namespace Flex\Banana\Adapters;

use Flex\Banana\Classes\TaskFlow;
use Flex\Banana\Classes\Log;

final class TaskJsonAdapter
{
  public const __version = '0.8.1';
  private array $workflow;
  private array $bannedEnvVars = [];
  private array $bannedConstants = [];

  // 무한루프 처리값 설정
  private const MAX_EXECUTION_STEPS = 100;

  public function __construct(array $workflow)
  {
    $this->workflow = $workflow;
  }

  // 금지할 환경 변수 목록을 배열로 한번에 설정하는 메소드
  public function setBannedEnvVars(array $bannedVars): self
  {
    $this->bannedEnvVars = $bannedVars;
    return $this;
  }

  // 금지할 상수 목록을 배열로 한번에 설정하는 메소드
  public function setBannedConstants(array $bannedConstants): self
  {
    $this->bannedConstants = $bannedConstants;
    return $this;
  }

  public function process(TaskFlow $flow): TaskFlow
  {
    $index = 0;
    $count = count($this->workflow);

    // SECURITY: DoS 방지를 위한 스텝 카운터 초기화
    $stepCounter = 0;

    // idMap: id => step index (for fast lookup)
    $idMap = [];
    foreach ($this->workflow as $i => $step) {
      if (isset($step['id'])) {
        $idMap[$step['id']] = $i;
      }
    }

    while ($index < $count)
    {
      $step = $this->workflow[$index];
          Log::d("");
      Log::d("=== STEP {$index} ". str_repeat("=", ($index+1)),  $step["title"] ?? $step["type"], "===");
          Log::d(json_encode($step));

      // 무한루프 처리
      if (++$stepCounter > self::MAX_EXECUTION_STEPS) {
        throw new \Exception("***최대 실행 스텝(" . self::MAX_EXECUTION_STEPS . "회)을 초과***");
      }

      try {
        $type = $step['type'] ?? 'class';

        // switch/if 조건 분기 처리
        if ($type === 'switch' || $type === 'if') {
          $newIndex = $this->handleConditionalStep($flow, $step, $idMap);
          if ($newIndex !== null) {
            $index = $newIndex;
            continue;
          }
        }

        // 일반 실행 처리
        match ($type) {
          'method' => $this->handleMethodStep($flow, $step),
```

```
        'function' => $this->handleFunctionStep($flow, $step),
        'class' => $this->handleClassStep($flow, $step),
        default => throw new \Exception("Unknown step type: " . $type),
      };

      $newIndex = $this->handleGoStep($step, $idMap);
      if ($newIndex !== null) {
        $index = $newIndex;
        continue;
      }
    } catch (\Throwable $e) {
            Log::e("********** ERROR **********");
            Log::e("[ JsonAdapter: 스텝 처리 중 예외 발생 ] ");
            Log::e($e->getMessage());
            Log::e("******************************");
      throw new \Exception($e->getMessage());
    }

  $index++;
  }

  Log::d("^^^^^^ JsonAdapter: 워크플로우", $index."건", "처리 완료 ^^^^^^^");
      Log::d("");

  return $flow;
}

private function handleMethodStep(TaskFlow $flow, array $step): void
{
  $resolve = fn($v) => $this->resolveContextReference($flow, $v);

  $objectName = $step['object'];
  $method     = $step['method'];
  $params     = array_map($resolve, $step['params'] ?? []);

  if (str_starts_with($objectName, 'enum::')) {
    $enumKey = substr($objectName, strlen('enum::'));

    if (enum_exists($enumKey)) {
      $target = $enumKey::cases()[0];
    }
    // 기본 네임 스페이스 폴백
    elseif (enum_exists("\\Columns\\{$enumKey}")) {
        $target = ("\\Columns\\{$enumKey}")::cases()[0];
    } else {
      throw new \Exception("Enum class {$enumKey} not found");
    }
  } else {
    $target = $flow->$objectName ?? null;
  }
  Log::d("{$objectName}->{$method} 호출 중, 파라미터: " . json_encode($params));

  if (!is_object($target) || (!is_callable([$target, $method]) && !method_exists($target, '__call'))) {
    throw new \Exception("Method {$method} not callable on object {$objectName}");
  }

  $result = call_user_func_array([$target, $method], $params);
      Log::d("===[".$step["title"]. "결과 ===");
      Log::d(json_encode($result));
      Log::d("");

  foreach (($step['outputs'] ?? []) as $ctxKey => $resultKey) {
    $flow->$ctxKey = $resultKey === 'self' ? $target : ($resultKey === '@return' ? $result : null);
  }
}

private function handleFunctionStep(TaskFlow $flow, array $step): void
{
  $resolve = function($v) use (&$resolve, $flow) {
    if (is_array($v)) {
      return array_map($resolve, $v);
    }
    return $this->resolveContextReference($flow, $v);
  };

  $function = $step['function'] ?? null;
  if (!$function) {
    throw new \Exception("Function '{$function}' not callable.");
  }
```

```
  // 열거적인 방법 호출 지원
  if (!empty($step['method']) && str_contains($function, '::')) {
    [$cls, $case] = explode('::', $function);
    if (enum_exists($cls)) {
      $enumInstance = constant("{$cls}::{$case}");
      $method = $step['method'];
      if (method_exists($enumInstance, $method)) {
        $params = array_map($resolve, $step['params'] ?? []);
        $result = call_user_func_array([$enumInstance, $method], $params);
        Log::d("(enum): {$cls}::{$case}->{$method} 호출 결과: " . json_encode($result));
        foreach (($step['outputs'] ?? []) as $ctxKey => $resultKey) {
            $flow->$ctxKey = $resultKey === '@return' ? $result : null;
        }
        return;
      } else {
        throw new \Exception("Method {$method} not found on enum {$cls}");
      }
    }
  }

  if (!is_callable($function)) {
    throw new \Exception("Function '{$function}' not callable.");
  }

  $params = array_map($resolve, $step['params'] ?? []);
  Log::d("함수 {$function} 호출 중, 파라미터: " . json_encode($params));

  // 변수 참조해야 하는 함수들  지원 (확장됨)
  if (in_array($function, ['array_push', 'array_unshift', 'array_shift', 'array_pop', 'sort', 'rsort', 'asort', 'ksort', 'usort', 'array_reverse'], true)) {
    if (!empty($params) && is_array($params[0])) {
      $ref = &$params[0];  // 참조

      if (in_array($function, ['sort', 'rsort', 'asort', 'ksort', 'usort'], true)) {
        $function($ref);
        $result = $ref;
      } else {
        $result = $function($ref);
      }

      // 이 라인 중요: 결과 배열을 다시 flow에 반영
      foreach (($step['outputs'] ?? []) as $ctxKey => $resultKey) {
        if ($resultKey === '@return') {
          $flow->$ctxKey = $result;
        } elseif ($resultKey === 'self') {
          $flow->$ctxKey = $ref;  // 참조 배열로 덮어쓰기
        }
      }
    } else {
        throw new \Exception("{$function} requires the first parameter to be an array.");
    }
  } else {
    $result = call_user_func_array($function, $params);
  }
  Log::d("===[".$step["title"]. "결과 ===");
      Log::d(json_encode($result));
      Log::d("");

  // '속성'이 설정된 경우 결과 오브젝트에서 속성 추출 지원
  if (!empty($step['property']) && is_object($result) && property_exists($result, $step['property'])) {
    $result = $result->{$step['property']};
  }

  foreach (($step['outputs'] ?? []) as $ctxKey => $resultKey) {
    if ($resultKey === '@return') {
      // 항상 컨텍스트에 최신 결과 반영
      $flow->$ctxKey = $result;
    } elseif (is_string($resultKey) && str_starts_with($resultKey, '@')) {
      $resolvedKey = substr($resultKey, 1);
      $flow->$ctxKey = $flow->$resolvedKey ?? null;
    } elseif (is_array($result) && isset($result[$resultKey])) {
      $flow->$ctxKey = $result[$resultKey];
    }
  }
}

private function handleClassStep(TaskFlow $flow, array $step): void
{
  $resolve = function($v) use (&$resolve, $flow) {
      if (is_array($v)) {
```

```
      return array_map($resolve, $v);
    }
    return $this->resolveContextReference($flow, $v);
};

try {
  $flow->do(function(TaskFlow $task) use ($step, $resolve) {
    try {
      $class  = $step['class'] ?? null;
      $method = $step['method'] ?? null;

      if ($class && $class[0] === '@') {
        $class = $task->{substr($class, 1)} ?? null;
      }

      if (!class_exists($class)) {
        throw new \Exception("Class {$class} not found");
      }

      $constructArgs = [];
      if (!empty($step['inputs']['@construct'])) {
        $constructArgs = array_map($resolve, $step['inputs']['@construct']);
        unset($step['inputs']['@construct']);
      } elseif (!empty($step['inputs']['construct'])) {
        $constructArgs = array_map($resolve, $step['inputs']['construct']);
        unset($step['inputs']['construct']);
      }
      Log::d("{$class} 인스턴스 생성 중, 생성자 인자: " . json_encode($constructArgs));

      $instance = new $class(...$constructArgs);
      $params = array_map($resolve, $step['params'] ?? []);
      if (!empty($step['inputs'])) {
        foreach ($step['inputs'] as $key => $ref) {
          if (isset($task->$ref)) {
            $params[$key] = $task->$ref;
          }
        }
      }
      Log::d("{$class}->{$method} 호출 중, 파라미터: " . json_encode($params));

      $result = call_user_func_array([$instance, $method], $params);
      if (!empty($step['property'])) {
        if (is_object($result) && property_exists($result, $step['property'])) {
          $result = $result->{$step['property']};
        } elseif (is_array($result) && isset($result[$step['property']])) {
          $result = $result[$step['property']];
        } elseif (is_object($instance) && property_exists($instance, $step['property'])) {
          $result = $instance->{$step['property']};
        }
      }

            Log::d("===[".$step["title"]. "결과 ===");
            Log::d(json_encode($result));
            Log::d("");

      // @return 해상도에 사용되는 경우 컨텍스트로 해결 된 결과를 주입.
      foreach ($step['outputs'] ?? [] as $ctxKey => $resultKey) {
        if (is_string($resultKey) && str_starts_with($resultKey, '@')) {
          $resolvedKey = substr($resultKey, 1);
          if (isset($task->{$resolvedKey})) {
            $step['outputs'][$ctxKey] = $task->{$resolvedKey};
          }
        }
      }

      foreach (($step['outputs'] ?? []) as $ctxKey => $resultKey) {
        if ($resultKey === '@class') {
          $task->{$ctxKey} = $instance;
        } elseif ($resultKey === '@return') {
          $task->{$ctxKey} = $result;
        } elseif (is_array($result) && isset($result[$resultKey])) {
          $task->{$ctxKey} = $result[$resultKey];
        }
      }

      return $task;
    } catch (\Throwable $e) {
        Log::e($e->getMessage());
        throw new \Exception($e->getMessage());
```

```
    }
   });
  } catch (\Throwable $e) {
            Log::e("********** ERROR **********");
            Log::e("[ JsonAdapter: 스텝 처리 중 예외 발생 ] ");
            Log::e($e->getMessage());
            Log::e("*******************************");
    throw new \Exception($e->getMessage());
  }
 }

 private function resolveContextReference(TaskFlow $flow, $value)
 {
  if ($value === '@task') {
    return $flow;
  }

  if (is_string($value) && str_starts_with($value, '@'))
  {
    $ref = substr($value, 1);

    // ENV::
    if (str_starts_with($ref, 'ENV::')) {
      $envVar = substr($ref, 5);
      // SECURITY CHECK: 금지된 환경 변수인지 확인
      if (in_array($envVar, $this->bannedEnvVars, true)) {
          throw new \Exception("보안 오류: 금지된 환경 변수('@ENV::{$envVar}')에 대한 접근이 차단되었습니다.");
      }
      return getenv($envVar) ?: null;
    }

    // DEFINE::
    if (str_starts_with($ref, 'DEFINE::')) {
      $const = substr($ref, 8);
      // SECURITY CHECK: 금지된 상수인지 확인
      if (in_array($const, $this->bannedConstants, true)) {
          throw new \Exception("보안 오류: 금지된 상수('@DEFINE::{$const}')에 대한 접근이 차단되었습니다.");
      }
      return defined($const) ? constant($const) : null;
    }

    // R::method.key1.key2
    if (preg_match('/^R::([a-zA-Z_]+)((?:\.[a-zA-Z0-9_]+)*)$/', $ref, $match)) {
      $method = $match[1];
      $path = ltrim($match[2], '.');
      $args = explode('.', $path);
      $base = call_user_func(['\\Flex\\Banana\\Classes\\R', $method], $args[0] ?? null);

      foreach (array_slice($args, 1) as $key) {
        if (is_array($base) && array_key_exists($key, $base)) {
          $base = $base[$key];
        } else {
          return null;
        }
      }
      return $base;
    }

    // @preset::EnumName()
    if (preg_match('/^([^:]+)::([^()]+)\(\)$/', $ref, $matches)) {
      [$_, $ctxKey, $enumKey] = $matches;
      $ctx = $flow->$ctxKey ?? null;
      if (is_array($ctx) && isset($ctx[$enumKey]) && $ctx[$enumKey] instanceof \BackedEnum) {
        return $ctx[$enumKey]->value;
      }
    }

    // @preset::EnumName || @object::property
    $parts = explode('::', $ref, 2);
    if (count($parts) === 2) {
        [$ctxKey, $enumKey] = $parts;
        $ctx = $flow->$ctxKey ?? null;
        if (is_array($ctx) && array_key_exists($enumKey, $ctx)) {
          $resolved = $ctx[$enumKey];
          if (is_string($resolved) && enum_exists($resolved)) {
            return $resolved::cases()[0];
          }
          if ($resolved instanceof \UnitEnum) {
            return $resolved;
```

```
            }
            return $resolved;
          }
        }

        // @object.property.subkey
        $parts = explode('.', $ref);
        $ctx = $flow->{$parts[0]} ?? null;
        if ($ctx === null) {
            Log::w("WARNING:", $value, "→ NULL (NOT FOUND)");
        }
        foreach (array_slice($parts, 1) as $key) {
          if ($ctx === null) {
              Log::w("WARNING:", $value, "→ NULL (NOT FOUND)");
              break;
          }
          $ctx = is_array($ctx) && isset($ctx[$key]) ? $ctx[$key] : null;
          if ($ctx === null) {
              Log::w("WARNING:", $value, "→ NULL (NOT FOUND)");
          }
        }
        return $ctx;

        // @enum::IdEnum.value 또는 @enum::IdEnum()
        if (preg_match('/^enum::([a-zA-Z0-9_\\\\]+)(?:\.(\w+))?$/', $ref, $match)) {
          $enumClass = $match[1];
          $enumProp = $match[2] ?? null;

          // 네임스페이스 보완
          if (!enum_exists($enumClass) && enum_exists("\\Columns\\{$enumClass}")) {
              $enumClass = "\\Columns\\{$enumClass}";
          }

          if (!enum_exists($enumClass)) {
              Log::w(":", $ref, "→ enum class not found");
              return null;
          }

          $enumInstance = $enumClass::cases()[0];

          if ($enumProp === 'value') {
              return $enumInstance->value;
          } elseif ($enumProp && method_exists($enumInstance, $enumProp)) {
              return $enumInstance->{$enumProp}(); // 메서드 실행
          } elseif ($enumProp) {
              return $enumInstance->{$enumProp} ?? null; // 속성
          }

          return $enumInstance; // 기본 객체 반환
        }
      }

      return $value;
    }

    private function handleConditionalStep(TaskFlow $flow, array $step, array $idMap): ?int
    {
      $condition = (string) $this->resolveContextReference($flow, $step['condition'] ?? '');
      $outputs = $step['outputs'] ?? [];
      Log::d('condition',$condition);
      // print_r($outputs);

      // □ 명시적으로 키 존재 여부 확인
      if (!array_key_exists($condition, $outputs) && !array_key_exists('default', $outputs)) {
          throw new \Exception("조건 {$condition}에 해당하는 분기 또는 기본(default) 분기가 없습니다.");
      }

      $nextId = $outputs[$condition] ?? $outputs['default'];
      Log::d('nextId',$nextId);
      if ($nextId && isset($idMap[$nextId])) {
          $nextIndex = $idMap[$nextId];
          return $nextIndex;
      }

      throw new \Exception("다음 단계 ID가 유효하지 않음: " . json_encode($nextId));
    }

    private function handleGoStep(array $step, array $idMap): ?int
    {
```

```
    if (!array_key_exists('go', $step) || $step['go'] === null || $step['go'] === '') {
      return null;
    }

    $nextId = $step['go'];
    if (isset($idMap[$nextId])) {
      $nextIndex = $idMap[$nextId];
      return $nextIndex;
    } else {
          Log::e("********** Go STEP ERROR **********");
          Log::e("Go step id '{$nextId}' not found");
          Log::e("******************************");
      throw new \Exception("Go step id '{$nextId}' not found");
    }
  }
}
```

--- 파일 경로: adapters/TaskJsonToMermaidAdapter.php ---

```
<?php
namespace Flex\Banana\Adapters;

use Flex\Banana\Classes\TaskFlow;
use Flex\Banana\Classes\Log;

final class TaskJsonToMermaidAdapter
{
  public const __version = '0.3.1';
  private array $workflow;

  public function process(array $workflow): string
  {
      $tasks = [];
    if (isset($workflow['tasks']) && is_array($workflow['tasks'])) {
      $tasks = $workflow['tasks'];
    } else {
      $tasks = $workflow;
    }

    if (empty($tasks)) {
      throw new \Exception("Mermaid로 변환할 Task 데이터가 없습니다.");
    }

    $this->workflow = $tasks;

    $nodes = [];
    $edges = [];
    $taskCount = count($this->workflow);

    // 노드(작업) 정의
    foreach ($this->workflow as $index => $task)
    {
      $taskId = !empty($task['id']) ? $task['id'] : "step{$index}";
      $title = htmlspecialchars($task['title'] ?? $taskId, ENT_QUOTES, 'UTF-8');
      $taskType = $task['type'] ?? null;

      if ($taskType === 'if' || $taskType === 'switch') {
        $nodes[] = "    {$taskId}{{\"{$title}\"}}";
      } else {
        $nodes[] = "    {$taskId}[\"{$title}\"]";
      }
    }

    // 연결(엣지) 정의
    foreach ($this->workflow as $index => $task)
    {
      $currentId = !empty($task['id']) ? $task['id'] : "step{$index}";
      $taskType    = $task['type'] ?? null;
      $isException = isset($task['class']) && str_contains($task['class'], 'ExceptionBasicTask');

      if ($taskType === 'if' || $taskType === 'switch')
      {
        if (isset($task['outputs']) && is_array($task['outputs'])) {
          foreach ($task['outputs'] as $condition => $target) {
```

```
            // [수정] target 값도 비어있지 않은지 확인
            if(!empty($target)) {
                $label = $condition === 'default' ? 'else' : $condition;
                $edges[] = "    {$currentId} -- \"{$label}\" --> {$target}";
            }
          }
        }
      }
      // [수정] 'go'의 값이 존재하는지와 비어있지 않은지를 함께 확인
      elseif (isset($task['go']) && !empty($task['go'])) {
        $edges[] = "    {$currentId} --> {$task['go']}";
      }
      elseif ($isException || $index === $taskCount - 1) {
        // 종료 노드는 연결 없음
      } else {
        $nextIndex = (int)$index + 1;
        if (isset($this->workflow[$nextIndex])) {
          $nextTask = $this->workflow[$nextIndex];
          $nextId = !empty($nextTask['id']) ? $nextTask['id'] : 'step' . $nextIndex;
          $edges[] = "    {$currentId} --> {$nextId}";
        }
      }
    }

    // 최종 Mermaid 문자열 조합
    $mermaidParts = ["graph TD"];
    $mermaidParts = array_merge($mermaidParts, $nodes, array_unique($edges));

    return implode("\n", $mermaidParts);
  }
}
```

--- 파일 경로: classes/App.php ---

```
<?php
namespace Flex\Banana\Classes;

# 접속에 따른 디바이스|브라우저등 정보
final class App
{
    public const __version      = '1.2';
    public static $platform     = 'Nan';
    public static $browser      = 'Nan';
    public static $host;
    public static $language     = 'ko';
    public static $locale       = 'ko_KR';
    public static $http_referer = null;
    public static $ip_address   = '';
    public static $protocol     = 'Nan';
    public static $version      = '1.0';

    public static function init() : void
    {
        self::detectPlatformAndBrowser();
        self::setHttpReferer();
        self::setLanguageAndLocale();
        self::setProtocolAndHost();
        self::$ip_address = self::getClientIp();
    }

    private static function detectPlatformAndBrowser() : void
    {
        $agent = $_SERVER['HTTP_USER_AGENT'] ?? '';

        $platforms = [
            'Linux' => 'Linux',
            'iPod' => 'iPod',
            'iPhone' => 'iPhone',
            'iPad' => 'iPad',
            'Windows Phone' => 'Windows Phone',
            'Windows CE' => 'Windows CE',
            'lgtelecom' => 'lgtelecom',
            'Android' => 'Android',
            'Macintosh' => 'Mac',
```

```
            'mac os x' => 'Mac',
            'Windows' => 'Windows',
            'Win32' => 'Windows'
        ];

        foreach ($platforms as $key => $value) {
            if (stristr($agent, $key)) {
                self::$platform = $value;
                break;
            }
        }

        $browsers = [
            'MSIE' => 'Explorer',
            'Firefox' => 'Firefox',
            'Chrome' => 'Chrome',
            'Safari' => 'Safari',
            'Opera' => 'Opera',
            'Netscape' => 'Netscape'
        ];

        foreach ($browsers as $key => $value) {
            if (stristr($agent, $key) && ($key !== 'MSIE' || !stristr($agent, 'Opera'))) {
                self::$browser = $value;
                break;
            }
        }
    }

    private static function setHttpReferer() : void
    {
        self::$http_referer = $_SERVER['HTTP_REFERER'] ?? null;
    }

    private static function setLanguageAndLocale() : void
    {
        if (isset($_SERVER['HTTP_ACCEPT_LANGUAGE'])) {
            $hal = explode(',', strtr($_SERVER['HTTP_ACCEPT_LANGUAGE'], [';' => ',', '-' => '_']));
            foreach ($hal as $v) {
                if (strpos($v, self::$language . '_') !== false) {
                    self::$locale = $v;
                    break;
                }
            }
            self::$language = substr($_SERVER['HTTP_ACCEPT_LANGUAGE'], 0, 2);
        }
    }

    private static function setProtocolAndHost() : void
    {
        self::$protocol = (isset($_SERVER['HTTPS']) && $_SERVER['HTTPS'] == "on") ? 'https' : 'http';
        self::$host = isset($_SERVER['HTTP_HOST']) ? self::$protocol . '://' . $_SERVER['HTTP_HOST'] : '';
    }

    public static function getClientIp() : string
    {
        $ipSources = [
            'HTTP_CLIENT_IP',
            'HTTP_X_FORWARDED_FOR',
            'HTTP_X_FORWARDED',
            'HTTP_FORWARDED_FOR',
            'HTTP_FORWARDED',
            'REMOTE_ADDR'
        ];

        foreach ($ipSources as $source) {
            if (isset($_SERVER[$source])) {
                return $_SERVER[$source];
            }
        }

        return '';
    }
}
```

--- 파일 경로: classes/Array/ArrayHelper.php ---

```php
<?php
namespace Flex\Banana\Classes\Array;

# 배열 사용에 도움을 주는 클래스
class ArrayHelper
{
    public const __version = '1.3.2';
    public function __construct(
        private array $value
    ){}

    # 멀티배열 키의 값으로 소팅 [{},{}]
    # sort : asc | desc
    # key : 소팅 비교할 키네임
    public function sorting(string $key, string $sorting = 'ASC') : ArrayHelper
    {
        $sorting = strtoupper($sorting);
        usort($this->value, function($a, $b) use ($key,$sorting) {
            return match($sorting){
                'DESC' => $this->desc($a[$key],$b[$key]),
                'ASC'  => $this->asc($a[$key],$b[$key])
            };
        });
    return $this;
    }

    # 멀티배열 중 원하는 값의 첫번째 키를 찾아낸다
    public function find(string $key, mixed $val) : ArrayHelper
    {
        $index = $this->findIndex($key, $val);
        if($index > -1){
            $this->value = $this->value[$index];
        }else $this->value = [];
    return $this;
    }

    # 멀티배열 중 원하는 값의 전체를 찾아 낸다
    public function findAll(string $key,...$params) : ArrayHelper
    {
        $values = $params;

        # 배열로 들어왔는지 체크
        if(is_array($params[0])){
            $values = $params[0];
        }

        $result = [];
        $argv = array_column($this->value, $key);
        foreach($argv as $idx => $val){
            foreach($values as $fval){
                if($val == $fval){
                    $result[] = $this->value[$idx];
                }
            }
        }
        $this->value = $result;
    return $this;
    }

    # select 여러키 중에서 원하는 키만 뽑아서 배열에 담기
    public function select(...$keys) : ArrayHelper
    {
        $this->value = array_map(function($item) use ($keys) {
            return array_intersect_key($item, array_flip($keys));
        }, $this->value);

        return $this;
    }

    # 멀티 키 => 밸류 값 찾기 OR
    public function findWhere (array $params, string $operator='AND') : ArrayHelper
    {
        $result = [];
        $find_mcnt   = count($params);
        $up_operator = strtoupper($operator);
        foreach ($this->value as $key => $value)
```

```
    {
        if($up_operator == 'AND')
        {
            $find_cnt = 0;
            foreach ($params as $fk => $fv) {
                if (isset($value[$fk])){
                    if(is_array($fv)){
                        $condition = $fv[0];
                        $fvalue = $fv[1];
                        switch($condition){
                            case '>': if($value[$fk] > $fvalue) $find_cnt++;break;
                            case '>=': if($value[$fk] >= $fvalue) $find_cnt++;break;
                            case '<': if($value[$fk] < $fvalue) $find_cnt++; break;
                            case '<=': if($value[$fk] <= $fvalue) $find_cnt++; break;
                            case '=': if($value[$fk] = $fvalue) $find_cnt++;break;
                            case '!=': if($value[$fk] != $fvalue) $find_cnt++;break;
                            case 'LIKE':
                                if(strpos($value[$fk],$fvalue) !==false) $find_cnt++;
                                break;
                            case 'LIKE-R':
                                if (preg_match('/^' . preg_quote($fvalue, '/') . '/', $value[$fk])) { $find_cnt++; }
                                break;
                            case 'LIKE-L':
                                if (preg_match('/^.*' . preg_quote($fvalue, '/') . '$/', $value[$fk])) { $find_cnt++; }
                                break;
                        }
                    }else if($value[$fk] == $fv){
                        $find_cnt++;
                    }
                }

                if($find_cnt == $find_mcnt){
                    $result[] = $value;
                }
            }
        }else{
            foreach ($params as $fk => $fv) {
                if (isset($value[$fk]) && $value[$fk] == $fv){
                    $result[] = $value;
                }
            }
        }
    }

    $this->value = $result;
return $this;
}

# 멀티 키 => 밸류 값 찾기
public function findWhereIndex (array $params) : int
{
    $result = -1;
    $find_mcnt = count($params);
    foreach ($this->value as $key => $value)
    {
        $find_cnt = 0;
        foreach ($params as $fk => $fv) {
            if (isset($value[$fk]) && $value[$fk] == $fv){
                $find_cnt++;
            }

            if($find_cnt == $find_mcnt){
                $result = $key;
                break;
            }
        }

        if($result>-1){
            break;
        }
    }
return $result;
}

# 중복 데이터 제거
public function unique(string $column_name) : ArrayHelper
{
    $result = [];
    $fd_args = array_unique(array_column($this->value, $column_name));
```

```
    foreach($fd_args as $idx => $val){
        $result[] = $this->value[$idx];
    }
    $this->value = $result;
return $this;
}

# 빈데이터가 있는 배열 찾기
public function isnull(...$params) : ArrayHelper
{
    $result = [];

    # 지정된 키들이 있는지 체크
    if(count($params) > 0){
        foreach($this->value as $idx => $arg){
            foreach ($params as $key) {
                if (isset($arg[$key]) && ($arg[$key] === '' || $arg[$key] === null)) {
                    $result[$idx] = $arg;
                    break;
                }
            }
        }
    }else{
        foreach($this->value as $idx => $arg){
            if (in_array('', $arg, true) || in_array(null, $arg, true)) {
                $result[$idx] = $arg;
            }
        }
    }
    $this->value = $result;
return $this;
}

# 빈데이터가 있는 배열 제거
public function dropnull(...$params) : ArrayHelper
{
    $result = [];
    # 지정된 키들이 있는지 체크
    if(count($params) > 0){
        foreach($this->value as $idx => $arg){
            foreach ($params as $key) {
                if (isset($arg[$key]) && ($arg[$key] !== '' || $arg[$key] !== null)) {
                    $result[] = $arg;
                    break;
                }
            }
        }
    }else{
        foreach($this->value as $idx => $arg){
            if (!in_array('', $arg, true) || !in_array(null, $arg, true)) {
                $result[] = $arg;
            }
        }
    }
    $this->value = $result;
return $this;
}

# 빈데이터 있는 배열에 데이터 채우기
public function fillnull(mixed $filldata) : ArrayHelper
{
    $is_arr = (is_array($filldata)) ? true : false;
    foreach($this->value as $idx => $arg){
        $cur_keys = array_keys($arg,null);
        foreach($cur_keys as $nkey){
            if($is_arr){
                if(isset($filldata[$nkey])){
                    $this->value[$idx][$nkey] = $filldata[$nkey];
                }
            }else{
                $this->value[$idx][$nkey] = $filldata;
            }
        }
    }
return $this;
}

# fill
public function fill(int $start=0, ?int $length=null, mixed $value=null) : ArrayHelper
```

```
{
    if ($length === null || $length < $start) {
        $length = $start;
    }

    // 원래의 배열 값을 유지하면서 새로운 범위만 변경
    $args = array_fill($start, $length, $value);
    $this->value = $this->value + $args;
return $this;
}

# 배열 끝에 추가
public function append(array $args) : ArrayHelper
{
    $this->value[] = $args;
return $this;
}

# 특정 배열의 int 값 sum 하기
public function sum(string $key = '') : int|float
{
    $result = ($key) ? $this->find_numeric($key) : $this->value;
    $sum = ($key) ? array_sum($result) : count($result);
return $sum;
}

# 특정 배열의 int 값 min 값
public function min(string $key = '') : int|float
{
    $result = ($key) ? $this->find_numeric($key) : array_keys($this->value);
    $min = 0;
    if(count($result)){
        $min = min($result);
    }
return $min;
}

# 특정 배열의 int 값 min 값
public function max(string $key = '') : int|float
{
    $result = ($key) ? $this->find_numeric($key) : array_keys($this->value);
    $max = 0;
    if(count($result)){
        $max = max($result);
    }
return $max;
}

# 특정 배열의 int 값의 평균 값
public function avg(string $key) : int|float
{
    $result = $this->find_numeric($key);
    $avg = 0;
    $cnt = count($result);
    if($cnt>0){
        $avg = array_sum($result) / $cnt;
    }
return $avg;
}

# union
public function union (array $params) : ArrayHelper
{
    $temp = [];

    # params columns
    $columns = [];
    foreach($params as $uikey => $pvalue){
        $columns[$uikey] = explode(',', $pvalue);
    }

    $arr = [];
    foreach($this->value as $uikey => $args)
    {
        $index = 0;
        foreach($args as $cidx => $cargs)
        {
            foreach($columns[$uikey] as $column_name){
                if(isset($temp[$column_name][$cidx])){
```

```
                $arr[$index][$column_name] = $cargs[$column_name];
            }
          }
        $index++;
        }
    }
    $this->value = $arr;
return $this;
}

# union All
public function unionAll(...$params) : ArrayHelper
{
    $this->value = call_user_func_array('array_merge', $params);
    return $this;
}

# index key number
public function findIndex(string $key, mixed $val) : int
{
    $result = -1;
    $index = array_search($val, array_column($this->value, $key));
    if($index !== false){
        $result = $index;
    }
return $result;
}

# split 배열 여러개씩 잘라서 묶음으로 배열화 하기
public function split(int $length = 2) : ArrayHelper {
    $this->value = array_chunk($this->value, $length );
return $this;
}

# slice 배열 자르기
public function slice(...$params) : ArrayHelper {
    $result = [];
    if(count($params) > 1){
        $result = array_slice($this->value, $params[0],$params[1]);
    }else {
        $result = array_slice($this->value, $params[0]);
    }

    $this->value = $result;

return $this;
}

# 모든배열의 키를 새롭게 바꿈
public function changeKeys (...$keys) : ArrayHelper | null
{
    $result = [];

    # key 만 뽑기
    $arrKeys = (isset($keys[0]) && is_array($keys[0])) ? array_values($keys[0]) : array_values($keys);

    # 키배열크기와 값크기가 일치하는지 체크 및 부족한 키 밸류키에서 넣기
    $kCnt = count($arrKeys);
    $vCnt = count($this->value[0]);
    $valueKeys = array_keys($this->value[0]);
    if($kCnt < $vCnt){
        for($i=$kCnt; $i < $vCnt; $i++){
            $arrKeys[] = $valueKeys[$i];
        }
    }else if($kCnt > $vCnt){
        $arrKeys = array_slice($arrKeys,0,$vCnt);
    }

    # change keys
    foreach($this->value as $index => $args){
        $result[] = array_combine($arrKeys, array_values($args));
    }
    $this->value = $result;

return $this;
}

public function map(callable $callback): self
{
```

```
        $this->value = array_map($callback, $this->value);
        return $this;
    }

    public function reduce(callable $callback, mixed $initial = null): mixed
    {
        return array_reduce($this->value, $callback, $initial);
    }

    # 원하는 키만 뽑아서 1차원 배열로 출력하기
    public function pluck(string $key) : ArrayHelper
    {
        $this->value = array_column($this->value, $key);
        return $this;
    }

    private function find_numeric (string $key) : array
    {
        $result = [];
        foreach($this->value as $a){
            if(is_numeric($a[$key])){
                $result[] = $a[$key];
            }
        }
    return $result;
    }

    private function asc ($a, $b ): mixed {
        return $a <=> $b;
    }

    private function desc ($a, $b ): mixed {
        return $a <= $b;
    }

    public function __get(string $propertyName){
        $result = [];
        if(property_exists($this,$propertyName)){
            $result = $this->{$propertyName};
        }
    return $result;
    }

    public function __set(string $propertyName, array $args) : void{
        if(property_exists($this,$propertyName)){
            if(is_array($args))
            $this->{$propertyName} = $args;
        }
    }
}
```

--- 파일 경로: classes/Auth/Session.php ---

```
<?php
namespace Flex\Banana\Classes\Auth;

final class Session
{
    public const __version = '1.1';

    # 세션 항목
    private $auth_args = [];
    private $authinfo = [];

    # run
    public function __construct(?Array $args){
        if (!is_null($args)){
            if(is_array($args) && count($args)>0){
                $this->auth_args = $args;
            }
        }
    }

    # 세션 키와 값 생성
```

```
    public function __set(string $k, mixed $v) : void{
        $this->authinfo[$k] = $v;
        if(!isset($_SESSION[$k]) && $v){
            $_SESSION[$k] = $v;
        }
    }

    # 세션 키값
    public function __get(string $k){
        if(array_key_exists($k, $this->authinfo))
            return $this->authinfo[$k];
    }

    # 세션생성된 전체 값
    public function fetch(): array
    {
        return $this->authinfo;
    }

    # 세션등록
    public function regiAuth(array $data_args) : void
    {
        if(is_array($data_args))
        {
            @session_start();
            foreach($this->auth_args as $k => $session_key){
                if(isset($data_args[$k]) && $data_args[$k]!=''){
                    #Flex\Banana\Log::d($session_key, $data_args[$k]);
                    $_SESSION[$session_key] = $data_args[$k];
                }
            }
        }
    }

    # 세션스타트 및 배열에 담기
    public function sessionStart() : void
    {
        if(is_array($_SESSION)){
            foreach($this->auth_args as $k => $session_key){
                if(isset($_SESSION[$session_key])){
                    $this->authinfo[$session_key] = $_SESSION[$session_key];
                }
            }
        }
    }

    #void
    # 세션비우기
    public function unregiAuth() : void{
        foreach($this->auth_args as $k=>$v)
        {
            $this->authinfo = [];
            if(isset($_SESSION[$v])){
                unset($_SESSION[$v]);
            }
        }
    }
}
```

--- 파일 경로: classes/Cache/CacheMem.php ---

```
<?php
namespace Flex\Banana\Classes\Cache;

use \Memcache;

class CacheMem
{
    public const __version = '0.5.1';
    private string $cache_key;

    private Memcache $memcache;

    public function __construct(
```

```
    private string $host='localhost',
    private int $port=11211
){
    $this->memcache = new Memcache;
    if(!$this->memcache->connect($this->host, $this->port)){
        throw new \Exception("Memcache connect fail...");
    }
}

public function __invoke(string $cache_key): CacheMem
{
    $this->cache_key = $cache_key;

    return $this;
}

public function __call(string $method,array $params) : mixed
{
    if(method_exists($this->memcache,$method))
    {
        $is_flag = match($method){
            'set','get','delete','flush','close' => false,
            default => true
        };
        return ($is_flag) ?
            call_user_func_array(array($this->memcache,$method),$params) :
                throw new \Exception("Memcache not exists method: {$method}");
    } else throw new \Exception("Memcache not exists method: {$method}");

}

# 서버 상태 체크 : 서버가 실패하면 0, 그렇지 않으면 0이 아님
public function _serverStatus() : mixed
{
    if(empty($this->memcache->getServerStatus($this->host, $this->port))){
        return null;
    }
return true;
}

/**
 * 캐시에 키-값 쌍을 설정
 *
 * @param mixed $data 캐싱될 데이터
 * @param int $expiration 캐시 만료 시간 = 0 - 만료되지 않음, 초 단위 >0
 */
public function _set(mixed $data, int $expiration = 0): CacheMem
{
    if (!$this->memcache->set($this->cache_key, $data, 0, $expiration)) {
        throw new \Exception("Memcache set failed for key: {$this->cache_key}");
    }
    return $this;
}

# 캐시에서 값을 가져오기
public function _get(): mixed
{
    $data = $this->memcache->get($this->cache_key);
    if ($data === false) {
        $data = null; // 캐시 값이 없는 경우
    }

    return $data;
}

# 캐시에서 키를 삭제
public function _delete(int $time = 0): void
{
    if(!$this->memcache->delete($this->cache_key, $time)){
        throw new \Exception("Memcache delete failed for key: {$this->cache_key}");
    }
}

# 캐시 비우기
public function _clear(): void
{
    if(!$this->memcache->flush()){
        throw new \Exception('Memcache clear failed');
    }
```

```
    }

    # 캐시 접속 종료
    public function _close() : void
    {
        if(!$this->memcache->close()){
            throw new \Exception('Memcache close failed');
        }
    }

    # 자동소멸
    public function __destruct(){
        $this->_close();
    }
}
```

--- 파일 경로: classes/Cache/CachedMem.php ---

```
<?php
namespace Flex\Banana\Classes\Cache;

use \Memcached;

class CachedMem
{
    public const __version = '0.1.1';
    private string $cache_key;

    private Memcached $memcached;

    public function __construct(
        private string $host = 'localhost',
        private int $port = 11211
    ) {
        $this->memcached = new Memcached();
        $this->memcached->addServer($this->host, $this->port);

        if (!$this->_serverStatus()) {
            throw new \Exception("Memcached connect fail...");
        }
    }

    public function __invoke(string $cache_key): CachedMem
    {
        $this->cache_key = $cache_key;

        return $this;
    }

    public function __call(string $method, array $params): mixed
    {
        if (!method_exists($this->memcached, $method)) {
            throw new \Exception("Method '{$method}' does not exist in Memcached.");
        }

        try {
            return call_user_func_array([$this->memcached, $method], $params);
        } catch (\Throwable $e) {
            throw new \Exception("Error calling method '{$method}': " . $e->getMessage(), 0, $e);
        }
    }


    # 서버 상태 체크 : 서버가 실패하면 false 반환, 성공하면 true
    public function _serverStatus(): bool
    {
        $stats = $this->memcached->getStats();
        return isset($stats["{$this->host}:{$this->port}"]) && $stats["{$this->host}:{$this->port}"]["pid"] > 0;
    }

    /**
     * 캐시에 키-값 쌍을 설정
     *
     * @param mixed $data 캐싱될 데이터
```

```
     * @param int $expiration 캐시 만료 시간 = 0 - 만료되지 않음, 초 단위 >0
     */
    public function _set(mixed $data, int $expiration = 0): CachedMem
    {
        if (!$this->memcached->set($this->cache_key, $data, $expiration)) {
            throw new \Exception("Memcached set failed for key: {$this->cache_key}");
        }
        return $this;
    }

    # 캐시에서 값을 가져오기
    public function _get(): mixed
    {
        $data = $this->memcached->get($this->cache_key);
        if ($data === false && $this->memcached->getResultCode() !== Memcached::RES_SUCCESS) {
            $data = null; // 캐시 값이 없는 경우
        }

        return $data;
    }

    # 캐시에서 키를 삭제
    public function _delete(): void
    {
        if (!$this->memcached->delete($this->cache_key)) {
            throw new \Exception("Memcached delete failed for key: {$this->cache_key}");
        }
    }

    # 캐시 비우기
    public function _clear(): void
    {
        if (!$this->memcached->flush()) {
            throw new \Exception('Memcached clear failed');
        }
    }

    # 캐시 접속 종료
    public function _close(): void
    {
        $this->memcached->quit();
    }

    # 자동소멸
    public function __destruct()
    {
        $this->_close();
    }
}
```

--- 파일 경로: classes/Calendars/Calendars.php ---

```
<?php
namespace Flex\Banana\Classes\Calendars;

use \DateTime;

# Parent Class : DateTime::';
class Calendars extends DateTime
{
    public const __version = '2.5.1';
    # 년
    private $year = 0;

    # 이달
    # @ monthname : August
    # @ shortmonthname : Aug
    # @ lastdaydow : 그달마지막날이 무슨요일(3) 값
    # @ lastday : 이달의 마지막 날짜
    # @ firstdaydow : 이달의 첫째날이 속한 요일(3)
    private $month = 0;
    private $lastday, $lastdaydow;
    private $firstdaydow;
    private $monthname, $shortmonthname;
```

```
# 오늘(일)
# @ dow : (일=0,월=1,화=2,수=3,목=4,금=5,토=6)
# @ dayname : Saturday
# @ shortdayname : Sat
# @ cur_week : 오늘 날짜가 속한주(2)째주
private $day = 0;
private $daydow, $dayname, $shortdayname;
private $cur_week;

# 이전 년월
private $pre_year;
private $pre_month;
private $pre_week;

# 다음 년월
private $next_year;
private $next_month;
private $next_week;

# 총 달력 데이타
/**
days_of_month[0] =array(1,2,3,4,5,6,7);
days_of_month[1] =array(8,9,10,11,12,13,14);
*/
private $days_of_month = [];

# 기념일 및 휴일설정
private $memorial_arg = [];

# 음력 관련
private $sunargs= array(20000101,20000107,20000201,20000205,20000301,20000306,20000401,20000405,
   20000501,20000504,20000601,20000602,20000701,20000702,20000731,20000801,20000829,20000901,
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);

private $moonargs = array (
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20130801,20130827,20130901,20130928,20131001,20131029,20131101,20131201,20140101,20140102,20140201,
20140301,20140302,20140401,20140403,20140501,20140504,20140601,20140605,20140701,20140706,20140801,
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20160527,20160601,20160629,20160701,20160801,20160901,20161001,20161002,20161101,20161103,20161201,
20161204,20170101,20170105,20170201,20170203,20170301,20170305,20170401,20170406,20170501,20170507,
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20180401,20180418,20180501,20180518,20180601,20180620,20180701,20180722,20180801,20180822,20180901,
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20190301,20190327,20190401,20190428,20190501,20190529,20190601,20190701,20190801,20190803,20190901,
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20200714,20200801,20200815,20200901,20200916,20201001,20201017,20201101,20201118,20201201,20201220,
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20210623,20210701,20210725,20210801,20210825,20210901,20210927,20211001,20211027,20211101,20211129,
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20250912,20251001,20251012,20251101,20251113,20251201,20251214,20260101,20260113,20260201,20260214,
20260301,20260315,20260401,20260416,20260501,20260517,20260601,20260619,20260701,20260720,20260801,
20260821,20260901,20260922,20261001,20261023,20261101,20261124,20261201,20261225,20270101,20270123,
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20270801,20270901,20270902,20271001,20271004,20271101,20271104,20271201,20271205,20280101,20280106,
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20280611,20280701,20280713,20280801,20280813,20280901,20280915,20281001,20281016,20281101,20281117,
20281201,20281218,20290101,20290117,20290201,20290218,20290301,20290318,20290401,20290420,20290501,
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20300501,20300601,20300701,20300703,20300801,20300804,20300901,20300905,20301001,20301006,20301101,
20301107,20301201,20301208,20310101,20310110,20310201,20310208,20310301,20310310,20310301,20310310,
20310401,20310412,20310501,20310512,20310601,20310614,20310701,20310715,20310801,20310815,20310901,
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20320827,20320901,20320929,20321001,20321029,20321101,20321201,20330101,20330102,20330201,20330301,
20330302,20330401,20330403,20330501,20330505,20330601,20330605,20330701,20330707,20330701,20330708,
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20340111,20340201,20340213,20340301,20340313,20340401,20340415,20340501,20340516,20340601,20340617,
20340701,20340719,20340801,20340819,20340901,20340921,20341001,20341021,20341101,20341122,20341201,
20341223,20350101,20350122,20350201,20350223,20350301,20350324,20350401,20350425,20350501,20350526,
20350601,20350628,20350701,20350729,20350801,20350901,20351001,20351002,20351101,20351102,20351201,
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20370924,20371001,20371025,20371101,20371126,20371201,20371228,20380101,20380126,20380201,20380227,
20380301,20380327,20380401,20380429,20380501,20380529,20380601,20380701,20380801,20380803,20380901,
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20390713,20390801,20390814,20390901,20390915,20391001,20391016,20391101,20391117,20391201,20391219,
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20400624,20400701,20400725,20400801,20400825,20400901,20400927,20401001,20401027,20401101,20401129,
20401201,20410101,20410129,20410201,20410301,20410401,20410402,20410501,20410503,20410601,20410604,
20410701,20410705,20410801,20410806,20410901,20410907,20411001,20411008,20411101,20411108,20411201,
20411210,20420101,20420111,20420201,20420210,20420201,20420211,20420301,20420312,20420401,20420414,
20420501,20420514,20420601,20420616,20420701,20420717,20420801,20420818,20420901,20420919,20421001,
20421019,20421101,20421120,20421201,20421222,20430101,20430120,20430201,20430222,20430301,20430322,
20430401,20430424,20430501,20430525,20430601,20430626,20430701,20430728,20430801,20430829,20430901,
20430930,20431001,20431101,20431201,20431202);

#@ void

```
# Y-m-d H:i:s
public function __construct($times){
    parent::__construct($times);
    self::resetTodayDate();
}

#@ void
#날짜 리셋
public function resetTodayDate() : void{
    $ymd_args    = explode('-',$this->format('Y-m-d'));
    $this->year  = $ymd_args[0];
    $this->month = $ymd_args[1];
    $this->day   = $ymd_args[2];

    self::fromJd();
    self::set_pre_next_date();
}

#@ void
# 오늘날짜에 속한 정보들을 얻는다
public function fromJd() :void{
    if(function_exists('unixtojd'))
    {
        $today_mktime =unixtojd(mktime(0,0,0,$this->month,$this->day, $this->year));
        $today_args =cal_from_jd($today_mktime, CAL_GREGORIAN);
        if(is_array($today_args))
        {
            #month
            $this->monthname      = $today_args['monthname'];
            $this->shortmonthname = (isset($today_args['abbrevmonthname'])) ? $today_args['abbrevmonthname'] : substr($today_args['monthname'],0,3);

            #day
            $this->daydow       = $today_args['dow'];
            $this->dayname      = $today_args['dayname'];
            $this->shortdayname = $today_args['abbrevdayname'];
            $this->firstdaydow  = date('w',mktime(0,0,0,$this->month,1,$this->year));
        }
        $this->lastday    = cal_days_in_month(CAL_GREGORIAN, $this->month, $this->year);
        $this->lastdaydow = date('w',mktime(0,0,0,$this->month,$this->lastday,$this->year));
    }else{
        $this->daydow         = date('w',mktime(0,0,0,$this->month,$this->day,$this->year));
        $this->firstdaydow    = date('w',mktime(0,0,0,$this->month,1,$this->year));
        $this->lastday        = date("t",mktime(0,0,1,$this->month,1,$this->year));
        $this->lastdaydow     = date('w',mktime(0,0,0,$this->month,$this->lastday,$this->year));
    }
}

#@ void
# 음력, 양력 기념일 데이타를 양력으로 통일 시킴
/**
= 입력 데이타 형식
[0] =array(
    'date'         =>[0000-01-01|2012-01-01],    #날짜
    'smtype'       =>[s|m],                      #양력|음력
    'repeat'       =>[y|m|n],                    #반복(년,월,없음)
    'holiday'      =>[0|1],                      #휴일여부,
    'holiday_plus' =>[0|1],                      #설날,추석같이 특이한 휴일설정일경우(추가휴일여부)
    'title'        =>신정                        #제목
)
*/
public function set_memorials(Array $memorials=array()) : void
{
    $count=count($memorials);
    for($i=0; $i<$count; $i++)
    {
        if(isset($memorials[$i]))
        {
            $m             =&$memorials[$i];
            $date_args     = explode('-',$m['date']);
            $this_int_date = $this->year.$date_args[1].$date_args[2];
            $int_date      = $date_args[0].$date_args[1].$date_args[2];
            $holiday_plus  = $m['holiday_plus'];

            # 반복아닌기념일
            # y : 년, m : 월, n : 반복없음
            if($m['smtype']=='m'){ # 음력
                switch($m['repeat']){
                    case 'y' :
                        self::set_memorials_holiday(self::get_moon2sun($this_int_date), $m['holiday'], $m['title'], $holiday_plus);
```

```
                    break;
                case 'm':
                    for($si=1; $si<13; $si++)
                        self::set_memorials_holiday(self::get_moon2sun($date_args[0].sprintf("%02d",$si).$date_args[2]), $m['holiday'], $m['title'],$holiday_plus);
                    break;
                default :
                    self::set_memorials_holiday(self::get_moon2sun($int_date), $m['holiday'], $m['title'],$holiday_plus);
            }
        }else{ # 양력
            switch($m['repeat']){
                case 'y' :
                    self::set_memorials_holiday($this_int_date, $m['holiday'], $m['title'], $holiday_plus);
                    break;
                case 'm':
                    for($si=1; $si<13; $si++)
                        self::set_memorials_holiday($this->year.sprintf("%02d",$si).$date_args[2], $m['holiday'], $m['title'],$holiday_plus);
                    break;
                default:
                    self::set_memorials_holiday($this_int_date, $m['holiday'], $m['title'],$holiday_plus);
            }
        }
    }
  }
}

#@ void
# 기념일 데이타를 입력
private function set_memorials_holiday($int_date, $holiday, $holiday_title,$holiday_plus) : void{
    $this->memorial_arg[$int_date] = ['holiday'=>$holiday,'title'=>$holiday_title];
    if($holiday_plus==1){
        $this->memorial_arg[$int_date-1] = ['holiday'=>$holiday,'title'=>''];
        $this->memorial_arg[$int_date+1] = ['holiday'=>$holiday,'title'=>''];
    }
}

#현재달력 구하기
public function set_days_of_month() : void
{
    $x=0;

    # 이전달
    if(function_exists('cal_days_in_month')){
        $pre_lastday = cal_days_in_month(CAL_GREGORIAN, $this->pre_month, $this->pre_year);
    }else{
        $pre_lastday = date("t",mktime(0,0,1,$this->pre_month,1,$this->pre_year));
    }

    if($this->firstdaydow==0) $s_pre_day=$pre_lastday-6;
    else $s_pre_day=$pre_lastday-($this->firstdaydow-1);

    for($i=$s_pre_day; $i<=$pre_lastday; $i++)
    {
        $tmp_date = sprintf("%04d-%02d-%02d", $this->pre_year,$this->pre_month,$i);
        $int_date = intval(str_replace('-','',$tmp_date));
        $this->days_of_month[$x][] =array(
            'date'        => $tmp_date,
            'day'         => $i,
            'moon'        => '',
            'holiday'     => '',
            'event_title' => '',
            'this_month'  => ''
        );
        $num=date('w',mktime(0,0,0,$this->pre_month,$i,$this->pre_year));
        if($num== 6) $x++;
    }

    # 현재달
    for($j=1; $j<=$this->lastday; $j++)
    {
        $tmp_date = sprintf("%04d-%02d-%02d", $this->year,$this->month,$j);
        $int_date = intval(str_replace('-','',$tmp_date));
        $int_day  = intval($this->day);

        #10일에 한번씩 [음력날짜] 계산 및 표기
        $moon_date='';
        if($j%10==0){
            $moon_date = self::get_sun2moon($int_date);
            $moon_date = substr($moon_date,4,2).'.'.substr($moon_date,-2);
        }
```

```
            # 기념일 및 휴일
            $holiday='';
            $event_title='';
            if(isset($this->memorial_arg[$int_date])){
                if(isset($this->memorial_arg[$int_date]['holiday']) && $this->memorial_arg[$int_date]['holiday']==1) $holiday = 1;
                $event_title = (isset($this->memorial_arg[$int_date]['title'])) ? $this->memorial_arg[$int_date]['title'] : '';
            }

            # 달력
            $this->days_of_month[$x][] =[
                'date'        => $tmp_date,
                'day'         => $j,
                'moon'        => $moon_date,
                'holiday'     => $holiday,
                'event_title' => $event_title,
                'this_month'  => 1
            ];
            $num=date('w',mktime(0,0,0,$this->month,$j,$this->year));
            if($j==$int_day){
                $this->pre_week  = $x-1;
                $this->cur_week  = $x;
                $this->next_week = $x+1;
            }
            if($num== 6) $x++;
        }

        # 다음달
        $nk=1;
        $snxt=($this->lastdaydow==6) ? 0 : $this->lastdaydow+1;
        for($k=$snxt;$k<7; $k++)
        {
            $tmp_date=sprintf("%04d-%02d-%02d", $this->next_year,$this->next_month,$nk);
            $int_date =intval(str_replace('-','',$tmp_date));
            $this->days_of_month[$x][] =[
                'date'        => $tmp_date,
                'day'         => $nk,
                'moon'        => '','holiday'=>'',
                'event_title' => '',
                'this_month'  => ''
            ];
            $num=date('w',mktime(0,0,0,$this->next_month,$nk,$this->next_year));
            $nk++;
            if($num== 6) $x++;
        }
    }

    # 이전 년월, 다음 년월 구하기
    public function set_pre_next_date() : void
    {
        $prev_year = $this->year-1;
        $next_year = $this->year+1;
        $month     = intval($this->month);
        if($month==1){
            $this->pre_year   = $prev_year;
            $this->next_year  = $this->year;
            $this->pre_month  = 12;
            $this->next_month = sprintf("%02d",$month+1);
        }
        else if($month==12){
            $this->pre_year   = $this->year;
            $this->next_year  = $next_year;
            $this->pre_month  = sprintf("%02d",$month-1);
            $this->next_month = 1;
        }
        else if($month !=1 && $month !=12)
        {
            $this->pre_year   = $this->year;
            $this->next_year  = $this->year;
            $this->pre_month  = sprintf("%02d",$month-1);
            $this->next_month = sprintf("%02d",$month+1);
        }
    }

    # 날짜수정 DAY
    public function modifyDay(int|string $day) : void{
        $this->modify($day." day");
        self::resetTodayDate();
    }
    # 날짜수정 WEEK
```

```
public function modifyWeek(int|string $week) : void{
    $this->modify($week." week");
    self::resetTodayDate();
}

# 날짜수정 MONTH
public function modifyMonth(int|string $month) : void{
    $this->modify($month." month");
    self::resetTodayDate();
}

#이전주에 해당하는 마지막일을 가지고 온다
public function get_pre_week_last_date() : date{
    $args = [];
    $pre_date = '';
    if(isset($this->days_of_month[$this->cur_week])){
        $args = $this->days_of_month[$this->cur_week];
    }

    if(isset($args[0]) && isset($args[0]['date'])){
        parent::__construct($args[0]['date']);
        $this->modify('-1 day');
        $pre_date = $this->format('Y-m-d');
    }
return $pre_date;
}

#다음주에 해당하는 첫일을 가지고 온다
public function get_next_week_first_date() : date{
    $args = [];
    $nxt_date = '';
    if(isset($this->days_of_month[$this->cur_week])){
        $args = $this->days_of_month[$this->cur_week];
    }

    if(isset($args[6]) && isset($args[6]['date'])){
        parent::__construct($args[6]['date']);
        $this->modify('+1 day');
        $nxt_date = $this->format('Y-m-d');
    }
return $nxt_date;
}

# 해당해의 띠
public function get_zodiac_sign() : string{
    $zodiac_sign_args = ['원숭이','닭','개','돼지','쥐','소','범','토끼','용','뱀','말','양'];
    $ddikey = intval($this->year % 12);
return $zodiac_sign_args[$ddikey];
}

# 육십갑자
public function get_sexagenary_cycle() : string{
    $tengan = ['경','신','임','계','갑','을','병','정','무','기'];
    $tenji    = ['신','유','술','해','자','축','인','묘','진','사','오','미'];

    $n1 = substr($this->year, -1);
    $n2 = intval($this->year % 12);

return $tengan[$n1].$tenji[$n2];
}

#@ return
# 양력->음력
# intdate : 20101020
public function get_sun2moon($intdate) : int{
    return self::date_binary_search($this->sunargs,$this->moonargs,$intdate);
}

# 음력->양력
public function get_moon2sun($intdate) : int{
    return self::date_binary_search($this->moonargs,$this->sunargs,$intdate);
}

# 음<->양 계산메소드
public function date_binary_search(&$haystack, &$haystack2, &$needle) : mixed
{
    $high = count($haystack);
    $low = 0;
    if ($needle < $haystack[$low] || $needle > $haystack[$high - 1]) {
```

```
            return false;
        }

        while ($high - $low > 1) {
            $mid = (int)(($high + $low) / 2); // Ensure division is part of the integer cast
            if ($haystack[$mid] < $needle) {
                $low = $mid;
            } else {
                $high = $mid;
            }
        }

        if ($high == count($haystack) || $haystack[$high] != $needle) {
            return $haystack2[$low] + ($needle - $haystack[$low]);
        } else {
            return $haystack2[$high];
        }
    }

    #@ return
    # 프라퍼티 값 가져오기
    public function __get($propertyname) : mixed{
        return $this->{$propertyname};
    }
}
```

--- 파일 경로: classes/Cipher/AES256Hash.php ---

```
<?php
namespace Flex\Banana\Classes\Cipher;

use Exception;

class AES256Hash
{
    public const __version = '1.0.2';

    private string $encrypt_method = 'AES-256-CBC';

    /**
     * AES-256 암호화를 수행
     *
     * @param string $plaintext 암호화할 평문
     * @param string $secret_key 비밀 키 random_bytes(32) | hex2bin($hex_string)
     * @param string $secret_iv 초기화 벡터 (IV) random_bytes(16) | bin2hex
     * @return string 암호화된 문자열 (base64 인코딩됨)
     * @throws Exception 암호화 실패 시
     */
    public function encrypt(string $plaintext, string $secret_key, string $secret_iv): string
    {
        $key = $this->prepareKey($secret_key);
        $iv = $this->prepareIV($secret_iv);

        $encrypted = openssl_encrypt($plaintext, $this->encrypt_method, $key, 0, $iv);

        if ($encrypted === false) {
            return '';
        }

        // RAW 데이터 출력 + URL-safe Base64
        return strtr(rtrim(base64_encode($encrypted), '='), '+/', '-_');
    }

    /**
     * AES-256 복호화를 수행
     *
     * @param string $ciphertext 복호화할 암호문 (base64 인코딩된 상태)
     * @param string $secret_key 비밀 키
     * @param string $secret_iv 초기화 벡터 (IV)
     * @return string 복호화된 평문
     * @throws Exception 복호화 실패 시
     */
    public function decrypt(string $ciphertext, string $secret_key, string $secret_iv): string
    {
```

```
        $key = $this->prepareKey($secret_key);
        $iv = $this->prepareIV($secret_iv);

        // URL-safe -> 표준 Base64 변환
        $ciphertext = base64_decode($ciphertext);
        $ciphertext = strtr($ciphertext, '-_', '+/') . str_repeat('=', strlen($ciphertext) % 4);

        $decrypted = openssl_decrypt($ciphertext, $this->encrypt_method, $key, 0, $iv);

        if ($decrypted === false) {
            return '';
        }

        return $decrypted;
    }

    /**
     * 비밀 키를 준비 (32바이트로 조정)
     *
     * @param string $secret_key 원본 비밀 키
     * @return string 32바이트로 조정된 키
     */
    private function prepareKey(string $secret_key): string
    {
        if (strlen($secret_key) === 32) {
            return $secret_key;
        }
        if (strlen($secret_key) > 32) {
            return substr($secret_key, 0, 32);
        }
        return str_pad($secret_key, 32, "\0", STR_PAD_RIGHT);
    }

    /**
     * 초기화 벡터(IV)를 준비 (16바이트로 조정)
     *
     * @param string $secret_iv 원본 IV
     * @return string 16바이트로 조정된 IV
     */
    private function prepareIV(string $secret_iv): string
    {
        if (strlen($secret_iv) === 16) {
            return $secret_iv;
        }
        if (strlen($secret_iv) > 16) {
            return substr($secret_iv, 0, 16);
        }
        return str_pad($secret_iv, 16, "\0", STR_PAD_RIGHT);
    }
}
```

--- 파일 경로: classes/Cipher/Base64UrlEncoder.php ---

```
<?php
namespace Flex\Banana\Classes\Cipher;

use Exception;

class Base64UrlEncoder
{
    public const __version = '1.0';

    protected string $data;

    public function __construct(string $data = '')
    {
        $this->data = $data;
    }

    /**
     * 데이터를 Base64Url로 인코딩
     *
     * @param string|null $data 인코딩할 데이터 (null이면 내부 데이터 사용)
     * @return string Base64Url 인코딩된 문자열
```

```
     * @throws Exception 인코딩 실패 시
     */
    public function encode(?string $data = null): string
    {
        $input = $data ?? $this->data;
        $base64 = base64_encode($input);
        if ($base64 === false) {
            throw new Exception("Base64 encoding failed", __LINE__);
        }
        return $this->urlEncode($base64);
    }

    /**
     * Base64Url 인코딩된 문자열을 디코딩
     *
     * @param string|null $data 디코딩할 Base64Url 문자열 (null이면 내부 데이터 사용)
     * @return string 디코딩된 원본 데이터
     * @throws Exception 디코딩 실패 시
     */
    public function decode(?string $data = null): string
    {
        $input = $data ?? $this->data;
        $base64 = $this->urlDecode($input);
        $decoded = base64_decode($base64, true);
        if ($decoded === false) {
            throw new Exception("Base64 decoding failed", __LINE__);
        }
        return $decoded;
    }

    /**
     * Base64 문자열을 URL 안전 형식으로 변환
     *
     * @param string $input Base64 문자열
     * @return string URL 안전 Base64 문자열
     */
    protected function urlEncode(string $input): string
    {
        return rtrim(strtr($input, '+/', '-_'), '=');
    }

    /**
     * URL 안전 Base64 문자열을 표준 Base64 형식으로 변환
     *
     * @param string $input URL 안전 Base64 문자열
     * @return string 표준 Base64 문자열
     */
    protected function urlDecode(string $input): string
    {
        $remainder = strlen($input) % 4;
        if ($remainder) {
            $input .= str_repeat('=', 4 - $remainder);
        }
        return strtr($input, '-_', '+/');
    }

    /**
     * 내부 데이터를 설정
     *
     * @param string $data 설정할 데이터
     */
    public function setData(string $data): void
    {
        $this->data = $data;
    }

    /**
     * 내부 데이터를 반환
     *
     * @return string
     */
    public function getData(): string
    {
        return $this->data;
    }
}
```

--- 파일 경로: classes/Cipher/CipherGeneric.php ---

```php
<?php
namespace Flex\Banana\Classes\Cipher;

use \ReflectionClass;
use \Exception;

class CipherGeneric
{
    public const __version = '1.0';

    private $processor;
    private static $allowedProcessors = [
        AES256Hash::class,
        HashEncoder::class,
        PasswordHash::class,
        Base64UrlEncoder::class,
        ROT13Encoder::class
    ];

    public function __construct($processor)
    {
        $this->setProcessor($processor);
    }

    private function setProcessor($processor): void
    {
        $reflection = new ReflectionClass($processor);
        if (!in_array($reflection->getName(), self::$allowedProcessors)) {
            throw new Exception("Unsupported processor type: " . $reflection->getName());
        }

        $this->processor = $processor;
    }

    public function __call($name, $arguments)
    {
        $reflection = new ReflectionClass($this->processor);
        if (!$reflection->hasMethod($name)) {
            throw new Exception("Method $name does not exist in " . get_class($this->processor));
        }

        $method = $reflection->getMethod($name);
        if (!$method->isPublic()) {
            throw new Exception("Method $name is not public in " . get_class($this->processor));
        }

        return $method->invokeArgs($this->processor, $arguments);
    }

    public static function addProcessor(string $processorClass): void
    {
        if (!class_exists($processorClass)) {
            throw new Exception("Class $processorClass does not exist");
        }

        if (!in_array($processorClass, self::$allowedProcessors)) {
            self::$allowedProcessors[] = $processorClass;
        }
    }

    public static function getAllowedProcessors(): array
    {
        return self::$allowedProcessors;
    }
}
```

--- 파일 경로: classes/Cipher/HashEncoder.php ---

```php
<?php
namespace Flex\Banana\Classes\Cipher;
use Exception;
```

```
class HashEncoder
{
    public const __version = '1.0';
    private string $encrypt_str;

    public function __construct(string $encrypt_str)
    {
        $this->encrypt_str = $encrypt_str;
    }

    public function hash(string $algorithm = 'sha256'): string
    {
        if (!in_array($algorithm, ['sha256', 'sha512'])) {
            throw new Exception("Unsupported hash algorithm", __LINE__);
        }
        $result = hash($algorithm, $this->encrypt_str);
        if ($result === false) {
            throw new Exception("Hash generation failed", __LINE__);
        }
        return $result;
    }
}
```

--- 파일 경로: classes/Cipher/PasswordHash.php ---

```
<?php
namespace Flex\Banana\Classes\Cipher;


class PasswordHash
{
    public const __version = '1.0';
    private array $options;

    /**
     * PasswordHasher 생성자
     *
     * @param int $memory_cost 메모리 사용량 (KiB, 기본값: 65536)
     * @param int $time_cost 반복 횟수 (기본값: 4)
     * @param int $threads 사용할 스레드 수 (기본값: 1)
     */
    public function __construct(int $memory_cost = 65536, int $time_cost = 4, int $threads = 1)
    {
        $this->options = [
            'memory_cost' => $memory_cost,
            'time_cost' => $time_cost,
            'threads' => $threads,
        ];
    }

    /**
     * 비밀번호를 해시.
     *
     * @param string $password 해시할 비밀번호
     * @return string 해시된 비밀번호
     */
    public function hash(string $password): string
    {
        if (defined('PASSWORD_ARGON2ID')) {
            return password_hash($password, PASSWORD_ARGON2ID, $this->options);
        } else {
            // Argon2id를 사용할 수 없는 경우 bcrypt로
            return password_hash($password, PASSWORD_DEFAULT);
        }
    }

    /**
     * 일치여부 비교
     *
     * @param string $password 확인할 비밀번호
     * @param string $hash 비교할 해시
     * @return bool 비밀번호가 일치하면 true, 그렇지 않으면 false
     */
    public function verify(string $password, string $hash): bool
```

```
    {
        return password_verify($password, $hash);
    }

    /**
     * 해시가 재해싱이 필요한지 확인
     *
     * @param string $hash 확인할 해시
     * @return bool 재해싱이 필요하면 true, 그렇지 않으면 false
     */
    public function needsRehash(string $hash): bool
    {
        if (defined('PASSWORD_ARGON2ID')) {
            return password_needs_rehash($hash, PASSWORD_ARGON2ID, $this->options);
        } else {
            return password_needs_rehash($hash, PASSWORD_DEFAULT);
        }
    }

    /**
     * 해시를 업그레이드
     *
     * @param string $password 원본 비밀번호
     * @param string $hash 현재 해시
     * @return string|null 새로운 해시 또는 업그레이드가 필요 없으면 null
     */
    public function upgradeHash(string $password, string $hash): ?string
    {
        if ($this->needsRehash($hash)) {
            return $this->hash($password);
        }
        return null;
    }
}
```

--- 파일 경로: classes/Cipher/ROT13Encoder.php ---

```
<?php
namespace Flex\Banana\Classes\Cipher;

/**
 * 알파벳을 13글자씩 밀어서 치환
 * 대소문자를 구분
 * ex) A->N, B->O, Z->M,
 * 알파벳이 아닌 문자(숫자, 특수문자, 공백 등)는 변경하지 않고 그대로 둠
 */
class ROT13Encoder
{
    public const __version = '1.0';
    private $encrypt_str = '';

    public function __construct(string $str){
        $this->encrypt_str = $str;
    }
    public function encode() {
        return str_rot13($this->encrypt_str);
    }
    public function decode() {
        return str_rot13($this->encrypt_str);
    }
}
```

--- 파일 경로: classes/Date/DateTimez.php ---

```
<?php
namespace Flex\Banana\Classes\Date;

use \DateTime;
use \DateTimeZone;
use \DateInterval;
```

```php
class DateTimez extends DateTime
{
    public const __version = '1.2';
    public DateTimeZone $dateTimeZone;
    public string $timezone;
    public array $location = [];
    public array $abbreviations = [];

    # time() || now || today || yesterday , Asia/Seoul
    public function __construct(string|int $times="now", string $timezone='')
    {
        # timezone
        if(!$timezone && function_exists('date_default_timezone_get')){
            $timezone = date_default_timezone_get();
        }
        $_timezone = $timezone ?? 'Asia/Seoul';
        $this->dateTimeZone = new DateTimeZone($_timezone);
        $this->timezone     = $this->dateTimeZone->getName();
        if(is_array($this->dateTimeZone->getLocation())){
            $this->location = $this->dateTimeZone->getLocation();
        }
        $this->filterAbbreviations(DateTimeZone::listAbbreviations());

        # datetime
        parent::__construct($this->chkTimestamp($times), $this->dateTimeZone);
    }

    private function filterAbbreviations(array $args) : void
    {
        foreach($args as $abbr => $reviations){
            foreach($reviations as $rv){
                if($rv['timezone_id']){
                    if($this->timezone == $rv['timezone_id']){
                        $this->location['abbr']   = strtoupper($abbr);
                        $this->location['offset'] = $rv['offset'];
                        $this->location['utc']    = ($rv['offset'] != 0) ? $rv['offset'] / 3600 : 0;
                        $this->location['dst']    = $rv['dst'];
                        break;
                    }
                }
            }
        }
    }

    public function chkTimestamp(string|int $times) : string
    {
        # datetime
        $_times = $times;
        if(is_int($times)){
            $_times = '@'.$times;
        }
    return $_times;
    }

    # modify, add, sub 기능
    public function formatter(string $formatter) : DateTimez
    {
        if(strpos($formatter,'-P') !==false){
            parent::sub(new DateInterval( str_replace('-','',$formatter) ));
        }else if(substr($formatter,0,1) == 'P'){
            parent::add(new DateInterval($formatter));
        }else if(substr($formatter,0,2) == '+P'){
            parent::add(new DateInterval(str_replace('+','',$formatter)));
        }else{
            parent::modify($formatter);
        }
    return $this;
    }

    # 날짜를 배열로 / 오늘이 무슨요일인지 / 1년중 몇째날째인지 포함
    public function parseDate(string $formatter = 'Y-m-d H:i:s') : array
    {
        $result = [];
        $localtimes = localtime(parent::format('U'),true);
        $result = date_parse(parent::format($formatter));
        $result['wday'] = $localtimes['tm_wday']; # 오늘이 주의 무슨요일에 해당하는지 0~6
        $result['yday'] = $localtimes['tm_yday']; # 오늘이 1년중 몇번째 날인지 체크 100/365
        unset($result['warning_count'],$result['warnings'],$result['error_count'],$result['errors']);
    return $result;
```

```
    }

    # 일몰/일출 정보
    public function sunInfo() : array
    {
        $result = [
            'timezone'     => $this->timezone,
            'country_code' => $this->location['country_code'] ?? '',
            'today'        => parent::format('Y-m-d')
        ];
        if(isset($this->location['latitude']) && $this->location['latitude']){
            $sun_info = date_sun_info(parent::format('U'), $this->location['latitude'], $this->location['longitude']);
            if(is_array($sun_info)){
                foreach ($sun_info as $fieldname => $val) {
                    $result[$fieldname] = match ($val) {
                        true    => 'always',
                        false   => 'never',
                        default => date_create("@".$val)->setTimeZone($this->dateTimeZone)->format( 'H:i:s' )
                    };
                }
            }
        }
    return $result;
    }
}
```

--- 파일 경로: classes/Date/DateTimezPeriod.php ---

```
<?php
namespace Flex\Banana\Classes\Date;

use Flex\Banana\Classes\Date\DateTimez;
use \DateTimeImmutable;
use \DateInterval;
use \DatePeriod;
use \Exception;

class DateTimezPeriod
{
    public const __version = '1.2';

    # Asia/Seoul
    public string $timezone = '';
    private array $relative_pos = [
        'year','month','day','hour','minute','second'
    ];

    public function __construct(string $timezone='')
    {
        # timezone
        if(!$timezone && function_exists('date_default_timezone_get')){
            $timezone = date_default_timezone_get();
        }
        $this->timezone = $timezone ?? 'Asia/Seoul';
    }

    /**
     * 특정 날짜와 타켓 날짜사이 시간차
     * format : 시간차 포멧
     * demical : 소수점 자리
     */
    public function diff(string $start_date, string $end_date, array $formatter = ["format"=>'default','demical'=>'2']) : mixed
    {
        $s = new DateTimeImmutable($start_date);
        $e = new DateTimeImmutable($end_date);
        $interval = $s->diff($e);

        # 월하는 데이터 형
        $result = match($formatter['format']) {
            'days','day' => $interval->days,
            'seconds'    => $interval->days * 86400 + $interval->h * 3600 + $interval->i * 60 + $interval->s,
            'minutes'    => ($interval->days * 86400 + $interval->h * 3600 + $interval->i * 60 + $interval->s) / 60,
            'hours'      => ($interval->days * 86400 + $interval->h * 3600 + $interval->i * 60 + $interval->s) / 3600,
            'minutes:seconds','i:s' => sprintf("%02d:%02d",( ($interval->days * 86400 + $interval->h * 3600 + $interval->i * 60) / 60),$interval->s),
```

```
            'hours:minutes:seconds','h:i:s' => sprintf("%02d:%02d:%02d",( ($interval->days * 86400 + $interval->h * 3600) / 3600), ($interval->i * 60 / 60),$interval->s),
            'months'      => (($interval->m /12) + ($interval->days / 30)),
            'months:days:hours:minutes:seconds','m-d h:i:s' => sprintf("%02d-%02d %02d:%02d:%02d",$interval->m,$interval->d,$interval->h,$interval->i,$interval->s),
            'top' => $interval->format("%y-%m-%d %h:%i:%s"),
            default => $interval->format("%Y-%M-%D %H:%I:%S")
        };

        # 소수점 자리 및 버리기
        if(isset($formatter['demical'])){
            if( in_array($formatter['format'], ['minutes','hours','months'])){
                if((int)$formatter['demical'] > 0){
                    $_f = (int)"1".str_repeat("0", $formatter['demical']);
                    $result = floor($result * $_f)/$_f;
                }else {
                    $result = floor($result);
                }
            }
        }

        # 시간이 큰것만 우선 순위 출력 약 시간 표시용
        # 약 1분전, 약 1시간전, 약10일전
        if($formatter['format'] == 'top')
        {
            $relative_timef = $this->aboutTopTime ($result);
            if($relative_timef){
                $result = $relative_timef;
            }
        }

    return $result;
    }

    # 날짜와 날짜 사이 날짜
    /**
     * interval : 1  // 날짜(1일, 3일)간격
     * days :  30 // 며칠(30일/개)
     */
    public function period(string $start_date, int $interval, int $days) : array
    {
        $result = [];

        $format = sprintf("P%dD", $interval);
        $startDateTimez = new DateTimez($start_date, $this->timezone);
        $interval  = new DateInterval($format);
        $period    = new DatePeriod($startDateTimez, $interval, $days);
        foreach($period as $dateTimez){
            $result[] = $dateTimez->format('Y-m-d');
        }

    return $result;
    }

    # 최상위 순서대로만 표시 y > m > d > h > i > s
    private function aboutTopTime (string $relative) : string
    {
        $result = '';
        $argv = explode('-',strtr($relative,[':'=>'-',' '=>'-']));
        foreach($argv as $idx => $v){
            if($v > 0){
                $formatter = ($v>1) ? $this->relative_pos[$idx].'s' : $this->relative_pos[$idx];
                $result = sprintf("%d %s",$v,$formatter);
                break;
            }
        }

    return $result;
    }
}
```

--- 파일 경로: classes/Db/CipherMysqlAes256Cbc.php ---

```
<?php
namespace Flex\Banana\Classes\Db;
use Flex\Banana\Classes\Db\Cipher;
```

```
use Flex\Banana\Classes\Db\DbCipherInterface;
use Flex\Banana\Classes\Db\DbManager;
use \PDO;
use \Exception;

class CipherMysqlAes256Cbc implements DbCipherInterface
{
    public const __version = '0.1';
    private const RANDOM_BYTES = 16;  // IV 길이
    public const ENCRYPTION_MODE = 'aes-256-cbc';

    public function __construct(
        private string $hashkey,
        private DbManager $dbManager
    ){
        $this->dbManager = $dbManager;
    }

    public function setHashKey(string $hashkey) : self
    {
        $this->hashkey = $hashkey;
    return $this;
    }

    public function encrypt(string $column): string
    {
        return "HEX(AES_ENCRYPT('{$column}', SHA2('{$this->hashkey}', 512), RANDOM_BYTES(" . self::RANDOM_BYTES . ")))";
    }

    public function decrypt(string $column): string
    {
        return "AES_DECRYPT(UNHEX($column), SHA2('{$this->hashkey}', 512))";
    }


    public function set_encryption_mode(): void
    {
        $pdo = $this->dbManager->pdo;

        # 서버 버전
        $mysql_version = $pdo->getAttribute(PDO::ATTR_SERVER_VERSION);
        if (version_compare($mysql_version, '5.7.0', '<')) {
            throw new Exception(sprintf("Setting(%s) is not possible for MySQL version lower than 5.7.0", CipherMysqlAes256Cbc::ENCRYPTION_MODE));
        }

        # encryption_mode 확인
        $encryption_mode_qry = "SELECT @@session.block_encryption_mode as em";
        $stmt = $pdo->query($encryption_mode_qry);
        $encryption_row = $stmt->fetch(PDO::FETCH_ASSOC);

        if (isset($encryption_row['em'])) {
            if ($encryption_row['em'] !== CipherMysqlAes256Cbc::ENCRYPTION_MODE) {
                $set_encrypt_qry = sprintf("SET @@session.block_encryption_mode = '%s'", CipherMysqlAes256Cbc::ENCRYPTION_MODE);
                $pdo->exec($set_encrypt_qry);
            }
        }
    }
}
```

--- 파일 경로: classes/Db/CipherPgsqlAes.php ---

```
<?php
namespace Flex\Banana\Classes\Db;

use Flex\Banana\Classes\Db\DbCipherInterface;

class CipherPgsqlAes implements DbCipherInterface
{
    public const __version = '0.1';
    public const ENCRYPTION_MODE = 'aes';
    public function __construct(
        private string $hashkey,
    ){}
    public function encrypt(string $column): string
```

```
    {
        return sprintf(
            "encode(encrypt(convert_to('%s', 'UTF8'), '".hash('sha256',$this->hashkey)."','".self::ENCRYPTION_MODE."'),'hex')",
            $column
        );
    }

    public function decrypt(string $column): string
    {
        return sprintf(
            "convert_from(decrypt(decode(%s, 'hex'), '".hash('sha256',$this->hashkey)."','".self::ENCRYPTION_MODE."'), 'UTF8')",
            $column
        );
    }
}
```

--- 파일 경로: classes/Db/CipherPgsqlAes256Cbc.php ---

```
<?php
namespace Flex\Banana\Classes\Db;

use Flex\Banana\Classes\Db\DbCipherInterface;

class CipherPgsqlAes256Cbc implements DbCipherInterface
{
    public const __version = '0.1';
    public const ENCRYPTION_MODE = 'aes-cbc';
    public function __construct(
        private string $hashkey,
    ){}

    public function encrypt(string $column): string
    {
        return sprintf(
            "encode(encrypt(convert_to('%s', 'UTF8'), '".hash('sha256',$this->hashkey)."','".self::ENCRYPTION_MODE."'),'hex')",
            $column
        );
    }

    public function decrypt(string $column): string
    {
        return sprintf(
            "convert_from(decrypt(decode(%s, 'hex'), '".hash('sha256',$this->hashkey)."','".self::ENCRYPTION_MODE."'), 'UTF8')",
            $column
        );
    }
}
```

--- 파일 경로: classes/Db/CipherPgsqlBasic.php ---

```
<?php
namespace Flex\Banana\Classes\Db;

use Flex\Banana\Classes\Db\DbCipherInterface;

class CipherPgsqlBasic implements DbCipherInterface
{
    public const __version = '0.1';
    public function __construct(
    ){}

    public function encrypt(string $column): string
    {
        return sprintf(
            "encode(convert_to('%s', 'UTF8'), 'hex')",
            $column
        );
    }

    public function decrypt(string $column): string
```

```
    {
        return sprintf(
            "convert_from(decode(%s, 'hex'), 'UTF8')",
            $column
        );
    }
}
```

--- 파일 경로: classes/Db/DbCipherGeneric.php ---

```
<?php
namespace Flex\Banana\Classes\Db;

use \ReflectionClass;
use \Exception;

class DbCipherGeneric
{
    public const __version = '1.0';

    private $processor;
    private static $allowedProcessors = [
        CipherMysqlAes256Cbc::class,
        CipherPgsqlAes256Cbc::class,
        CipherPgsqlBasic::class,
        CipherPgsqlAes::class,
    ];

    public function __construct($processor)
    {
        $this->setProcessor($processor);
    }

    private function setProcessor($processor): void
    {
        $reflection = new ReflectionClass($processor);
        if (!in_array($reflection->getName(), self::$allowedProcessors)) {
            throw new Exception("Unsupported processor type: " . $reflection->getName());
        }

        $this->processor = $processor;
    }

    public function __call($name, $arguments)
    {
        $reflection = new ReflectionClass($this->processor);
        if (!$reflection->hasMethod($name)) {
            throw new Exception("Method $name does not exist in " . get_class($this->processor));
        }

        $method = $reflection->getMethod($name);
        if (!$method->isPublic()) {
            throw new Exception("Method $name is not public in " . get_class($this->processor));
        }

        return $method->invokeArgs($this->processor, $arguments);
    }

    public static function addProcessor(string $processorClass): void
    {
        if (!class_exists($processorClass)) {
            throw new Exception("Class $processorClass does not exist");
        }

        if (!in_array($processorClass, self::$allowedProcessors)) {
            self::$allowedProcessors[] = $processorClass;
        }
    }

    public static function getAllowedProcessors(): array
    {
        return self::$allowedProcessors;
    }
}
```

--- 파일 경로: classes/Db/DbCipherInterface.php ---

```php
<?php
namespace Flex\Banana\Classes\Db;
interface DbCipherInterface
{
    public function encrypt(string $value): string;
    public function decrypt(string $value): string;
}
```

--- 파일 경로: classes/Db/DbCouch.php ---

```php
<?php
namespace Flex\Banana\Classes\Db;

use Flex\Banana\Classes\Log;
use Flex\Banana\Classes\Json\JsonEncoder;
use Flex\Banana\Classes\Db\DbResultCouch;
use Flex\Banana\Classes\Db\DbInterface;
use Flex\Banana\Classes\Http\HttpRequest;
use Flex\Banana\Classes\Array\ArrayHelper;
use Flex\Banana\Classes\Date\DateTimez;
use \Exception;
use \ArrayAccess;

class DbCouch extends QueryBuilderAbstractCouch implements DbInterface, ArrayAccess
{
    public const __version = '0.3.1';
    private const BASE_URL = "http://{host}:{port}";

    public string $baseUrl;
    private string $authHeader;
    private string $database;
    private array $params = [];
    private array $executeQueries = [];
    private string $table = '';

    public function __construct(
        WhereCouch $whereCouch
    )
    {
        parent::__construct($whereCouch);
        $this->baseUrl = '';
        $this->authHeader = '';
        $this->database = '';
    }

    # @ DbSqlInterface
    public function connect(string $host, string $dbname, string $user, string $password, int $port, string $charset, ?array $options = []): self
    {
        $this->baseUrl = $this->bindingDNS(self::BASE_URL, [
            "host" => $host,
            "port" => $port
        ]);

        $this->authHeader = "Authorization: Basic " . base64_encode("$user:$password");
        $httpRequest = new HttpRequest();
        $httpRequest->set($this->baseUrl, "", [$this->authHeader,"Content-Type: application/json"]);
        $httpRequest->get(function($response) {
            if (empty($response) || isset($response[0]['error'])) {
                throw new Exception("Failed to connect to CouchDB server");
            }
        });

    return $this->selectDB($dbname);
    }

    # @ DbSqlInterface
    public function selectDB(string $dbname): self
```

```
{
    $httpRequest = new HttpRequest();
    $dbUrl = $this->baseUrl . "/$dbname";
    if($this->database != $dbname){
        $httpRequest->set($dbUrl, "", [$this->authHeader,"Content-Type: application/json"]);
        $httpRequest->get(function($response) use ($dbname) {
            if (empty($response) || isset($response[0]['error'])) {
                throw new Exception("Failed to connect to database '$dbname'");
            }
        });
        $this->database = $dbname;
    }
    return $this;
}

# @ DbSqlInterface
public function whereHelper(): WhereCouch
{
    return $this->whereCouch;
}


# @ DbSqlInterface
public function query(string $query = '', array $params = []): DbResultCouch | array
{
    if (!$query) {
        $query = JsonEncoder::toJson([$this->get()]);
    }

    try{
        $httpRequest = new HttpRequest();
        $url = ($this->table) ? $this->baseUrl."/{$this->database}/_partition/{$this->table}/_find" : $this->baseUrl."/{$this->database}/_find";
        $params = json_decode($query,true);
        foreach($params as $param){
            $httpRequest->set($url, JsonEncoder::toJson($param), [$this->authHeader,'Content-Type: application/json']);
        }

        $result = [];
        $httpRequest->post(function($response) use (&$result) {
            foreach($response as $body){
                if (empty($body) || isset($body['error'])) {
                    throw new Exception("Query failed: " . ($body['error'] ?? 'Unknown error'));
                }
                $result[] = new DbResultCouch($body);
            }
        });

        if(count($result)==1){
            $result = $result[0];
        }
        return $result;
    }catch(Exception $e){
        throw new Exception($e->getMessage());
    }
}

# @ DbSqlInterface
public function insert(): void
{
    if (empty($this->params)) {
        throw new Exception("Empty params");
    }

    if(!isset($this->params['_id']) && $this->table){
        $this->params['_id'] = $this->table.':'.$this->generate_id();
    }

    $this->executeQueries[] = [
        "params"  => $this->params
    ];

    parent::init();
    $this->params = [];
}

private function generate_id() : string {
    $now = (new DateTimez("now"))->format('YmdHis');
    $microtodate = $now . substr((string)microtime(), 2, 6);
    $uniqid = substr(uniqid(rand(), true), 0, 6); // 고유한 짧은 문자열
```

```
    return $microtodate.'-'.$uniqid;
}

# @ DbSqlInterface
public function update(): void
{
    if (empty($this->params)) {
        throw new Exception("Empty parameters or selector is missing");
    }

    # where 문에서 _id 값 찾기
    if(!isset($this->params['_id']))
    {
        $selectors = (isset($this->query_params['selector']['$and'])) ? $this->query_params['selector']['$and']: $this->query_params['selector'];
        $wheres = (new ArrayHelper($selectors))->select("_id")->value;
        if(!isset($wheres[0]) || !isset($wheres[0]['_id'])){
            throw new Exception("Empty _id is missing");
        }

        $_id = array_values($wheres[0]['_id'])[0];
        $this->params['_id'] = $_id;
    }

    # _id 값만 추출하기 및 fields 등록
    if(!isset($this->params['_id'])){
        throw new Exception("Empty _id value is missing");
    }

    # _rev 가 있는지 체크
    if(!isset($this->params['_rev'])){
        throw new Exception("Empty _rev is missing");
    }

    $this->executeQueries[] = [
        "params"  => $this->params
    ];

    parent::init();
    $this->params = [];
}

# @ DbSqlInterface
public function delete(): void
{
    # where 문에서 _id 값 찾기
    if(!isset($this->params['_id'])){
        $selectors = (isset($this->query_params['selector']['$and'])) ? $this->query_params['selector']['$and']: $this->query_params['selector'];
        $wheres = (new ArrayHelper($selectors))->select("_id")->value;
        if(!isset($wheres[0]) || !isset($wheres[0]['_id'])){
            throw new Exception("Empty _id is missing");
        }

        $_id = array_values($wheres[0]['_id'])[0];
        $this->params['_id'] = $_id;
    }

    # _id 값만 추출하기 및 fields 등록
    if(!isset($this->params['_id'])){
        throw new Exception("Empty _id value is missing");
    }

    # _rev 가 있는지 체크
    if(!isset($this->params['_rev'])){
        throw new Exception("Empty _rev is missing");
    }
    $this->params['_deleted'] = true;

    $this->executeQueries[] = [
        "params"  => $this->params
    ];

    parent::init();
    $this->params = [];
}

public function createDatabase(string $dbname): void
{
    try {
        $httpRequest = new HttpRequest();
```

```
        $dbUrl = $this->baseUrl . "/$dbname";
        $httpRequest->set($dbUrl, "", [$this->authHeader,"Content-Type: application/json"]);
        $httpRequest->put(function($response) use ($dbname) {
            if (empty($response) || isset($response[0]['error'])) {
                throw new Exception("Failed to create database '$dbname'");
            }
        });
    } catch (Exception $e) {
        throw new Exception($e->getMessage());
    }
}

# @ QueryBuilderAbstractCouch
public function total(string $column_name = '_id'): int
{
    $this->set('fields', [$column_name]);
    $this->set('limit', 1);
    $query = $this->get();
    $query['execution_stats'] = true;

    $result = $this->query(JsonEncoder::toJson([$query]));

    if ($result instanceof DbResultCouch) {
        $executionStats = $result->get_execution_stats();
        if (is_array($executionStats) && isset($executionStats['total_docs'])) {
            return (int)$executionStats['total_docs'];
        }
    }

    // 실행 통계를 얻지 못한 경우, 전체 문서를 가져와서 카운트
    $this->init(); // 쿼리 파라미터 초기화
    $this->set('fields', ['_id']);
    $allDocsResult = $this->query(JsonEncoder::toJson([$this->get()]));

    return $allDocsResult->num_rows();
}

# @ QueryBuilderAbstractCouch
public function table(...$tables): self
{
    if(empty($tables[0])){
        throw new Exception("Empty table(type) is missing");
    }

    parent::init();
    $this->table = $tables[0];
    return $this;
}

# @ QueryBuilderAbstractCouch
public function select(...$columns) : self{
    if(count($columns) == 1){
        if(strpos($columns[0],",") !==false) {
            $columns = explode(",", $columns[0]);
        }
    }
    if($columns[0] != '*'){
        if(!in_array('_rev',$columns)){
            $columns[] = '_rev';
        }
        $this->set('fields', $columns);
    }
return $this;
}

# @ QueryBuilderAbstractCouch
public function where(...$where): self
{
    $result = null;
    if(isset($where[0]) && $where[0]){
        $result = (!isset($where[1])) ? $where[0] : $this->buildWhere($where);
    }
    if($result !==null && $result){
        $this->set('selector', $result);
    }
return $this;
}

# @ QueryBuilderAbstractCouch
```

```
public function orderBy(...$orderby): self
{
    $sort = [];
    foreach ($orderby as $field) {
        $direction = 'asc';
        $field = strtolower($field);
        if (strpos($field, ' desc') !== false) {
            $field = str_replace(' desc', '', $field);
            $direction = 'desc';
        }
        $sort[] = [$field => $direction];
    }
    $this->set('sort', $sort);
    return $this;
}

# @ QueryBuilderAbstractCouch
public function limit(...$limit): self
{
    if (isset($limit[1])) {
        $this->set('skip', $limit[0]);
        $this->set('limit', $limit[1]);
    } else {
        $this->set('limit', $limit[0]);
    }
    return $this;
}

# @ QueryBuilderAbstractCouch
public function useIndex(...$index): self
{
    $this->set('use_index', $index);
    return $this;
}

public function beginTransaction(): void
{
    parent::init();
    $this->params = [];
    $this->executeQueries = [];
}

public function commit(): mixed
{
    $result = null;
    $executeQueries = $this->executeQueries;

    parent::init();
    $this->params = [];
    $this->executeQueries = [];

    $httpRequest = new HttpRequest();
    try {
        $bulkDocs = ['docs' => array_map(fn($query) => $query['params'], $executeQueries)];
        // $url = ($this->table) ? $this->baseUrl."/{$this->database}/_partition/{$this->table}/_bulk_docs" : $this->baseUrl."/{$this->database}/_bulk_docs";
        $url = $this->baseUrl."/{$this->database}/_bulk_docs";
        $params = JsonEncoder::toJson($bulkDocs);

        $httpRequest->set($url, $params, [$this->authHeader, "Content-Type: application/json"]);
        $result = $httpRequest->post(function($response) {
            foreach ($response as $body) {
                if (empty($body) || isset($body['error'])) {
                    throw new Exception("Bulk operation failed: " . ($body['error'] ?? 'Unknown error'));
                }
            }
            return true;
        });
    } catch (Exception $e) {
        throw new Exception($e->getMessage());
    }

    return $result;
}

public function rollBack(): void
{
    parent::init();
    $this->params = [];
    $this->executeQueries = [];
```

```
    }

    public function offsetSet($offset, $value): void
    {
        $this->params[$offset] = $value;
    }

    # @ ArrayAccess
    # 사용법 : isset($obj["two"]); -> bool(true)
    public function offsetExists($offset) : bool{
        return isset($this->params[$offset]);
    }

    # @ ArrayAccess
    # 사용법 : unset($obj["two"]); -> bool(false)
    public function offsetUnset($offset) : void{
        unset($this->params[$offset]);
    }

    # @ ArrayAccess
    # 사용법 : $obj["two"]; -> string(7) "A value"
    public function offsetGet($offset) : mixed{
        return isset($this->params[$offset]) ? $this->params[$offset] : null;
    }

    public function __call($method, $args)
    {
    }

    public function __get(string $propertyName)
    {
        if ($propertyName == 'query') {
            return $this->get();
        } else {
            return $this->{$propertyName} ?? null;
        }
    }
}
```

--- 파일 경로: classes/Db/DbInterface.php ---

```
<?php
namespace Flex\Banana\Classes\Db;

# purpose : 각종 SQL 관련 디비를 통일성있게  작성할 수 있도록 틀을 제공
interface DbInterface
{
    public function connect(string $host, string $dbname, string $user, string $password, int $port, string $charset, ?array $options=[]) : self;
    public function selectDB( string $dbname ): self;
    public function whereHelper() : WhereCouch|WhereSql;
    public function query(string $query='', array $params = []) : DbResultSql|DbResultCouch|array;            # 쿼리
    public function insert() : void;    # 저장
    public function update() : void;    # 수정
    public function delete() : void;    # 삭제
}
```

--- 파일 경로: classes/Db/DbManager.php ---

```
<?php
namespace Flex\Banana\Classes\Db;

use Flex\Banana\Classes\Log;
use \ReflectionClass;
use \Exception;
use \ArrayAccess;

class DbManager implements ArrayAccess
{
    public const __version = '1.0.1';
    private $processor;
```

```
private static $allowedProcessors = [
    DbMySql::class,
    DbPgSql::class,
    DbCouch::class,
];

public function __construct($processor)
{
    $this->setProcessor($processor);
}

private function setProcessor($processor): void
{
    $reflection = new ReflectionClass($processor);
    if (!in_array($reflection->getName(), self::$allowedProcessors)) {
        throw new Exception("Unsupported processor type: " . $reflection->getName());
    }

    $this->processor = $processor;
}

public function offsetSet($offset, $value): void
{
    $this->processor->offsetSet($offset, $value);
}

public function offsetExists($offset): bool
{
    return $this->processor->offsetExists($offset);
}

public function offsetUnset($offset): void
{
    $this->processor->offsetUnset($offset);
}

public function offsetGet($offset): mixed
{
    return $this->processor->offsetGet($offset);
}

public function __call($name, $arguments)
{
    $reflection = new ReflectionClass($this->processor);
    if ($reflection->hasMethod($name)) {
        $method = $reflection->getMethod($name);
        if ($method->isPublic()) {
            return $method->invokeArgs($this->processor, $arguments);
        }
    }

    // 프로세서의 __call 메소드 호출
    if ($reflection->hasMethod('__call')) {
        return $this->processor->__call($name, $arguments);
    }

    throw new Exception("Method $name does not exist in " . get_class($this->processor));
}

public function __get(string $propertyName)
{
    return $this->processor->__get($propertyName);
}

public function __set(string $propertyName, mixed $value)
{
    return $this->processor->__set($propertyName,$value);
}

public static function addProcessor(string $processorClass): void
{
    if (!class_exists($processorClass)) {
        throw new Exception("Class $processorClass does not exist");
    }

    if (!in_array($processorClass, self::$allowedProcessors)) {
        self::$allowedProcessors[] = $processorClass;
    }
}
```

```
    public static function getAllowedProcessors(): array
    {
        return self::$allowedProcessors;
    }
}
```

--- 파일 경로: classes/Db/DbMySql.php ---

```
<?php
namespace Flex\Banana\Classes\Db;

use Flex\Banana\Classes\Db\QueryBuilderAbstractSql;
use Flex\Banana\Classes\Db\DbResultSql;
use Flex\Banana\Classes\Db\DbInterface;
use \PDO;
use \PDOException;
use \Exception;
use \ArrayAccess;

class DbMySql extends QueryBuilderAbstractSql implements DbInterface,ArrayAccess
{
    public const __version = '0.1.3';
    private const DSN = "mysql:host={host};port={port};dbname={dbname};charset={charset}";
    public $pdo;
    private $params = [];
    private array $pdo_options = [
        PDO::ATTR_ERRMODE => PDO::ERRMODE_EXCEPTION,
        PDO::ATTR_DEFAULT_FETCH_MODE => PDO::FETCH_ASSOC
    ];

    public function __construct(
        WhereSql $whereSql
    ){
        parent::__construct($whereSql);
    }

    # @ DbSqlInterface
    public function connect(string $host, string $dbname, string $user, string $password, int $port, string $charset, ?array $options=[]) : self
    {
        try {
            $dsn = $this->bindingDNS(self::DSN, [
                "host"    => $host,
                "dbname"  => $dbname,
                "port"    => $port,
                "charset" => $charset
            ]);
            $this->pdo = new PDO($dsn, $user, $password, $this->pdo_options+$options);
        } catch (PDOException $e) {
            throw new Exception($e->getMessage());
        }

        return $this->selectDB( $dbname );
    }

    # @ DbSqlInterface
    public function selectDB( string $dbname ): self
    {
        $query ="SELECT DATABASE()";
        $result = $this->pdo->query($query)->fetchColumn();
        if ($result !== $dbname) {
            throw new Exception("Connected to database '$result' instead of '$dbname'");
        }
    return $this;
    }

    # @ DbSqlInterface
    public function whereHelper(): WhereSql
    {
        return $this->whereSql;
    }

    # @ DbSqlInterface
    public function query(string $query = '', array $params = []): DbResultSql
    {
```

```
    if (!$query) {
        $query = $this->query = parent::get();
    }

    // echo "Executing query: " . $query . PHP_EOL;
    // print_r($params);

    try {
        $stmt = $this->pdo->prepare($query);
        $result = $stmt->execute($params ?: null);
        if (!$result) {
            throw new Exception("Execution failed: " . implode(", ", $stmt->errorInfo()));
        }

        return new DbResultSql($stmt);
    } catch (PDOException $e) {
        throw new Exception("Query failed: " . $e->getMessage());
    }
}

protected function quoteIdentifier($identifier): string
{
    return '`' . str_replace('`', '``', $identifier) . '`';
}

# @ DbSqlInterface
public function insert() : void {
    if (empty($this->params)) {
        throw new Exception("Empty : params");
    }

    $fields = [];
    $placeholders = [];
    $boundParams = [];

    foreach ($this->params as $field => $value) {
        $fields[] = $field;

        // Check for HEX(AES_ENCRYPT and encode(encrypt_iv
        if (is_string($value) && str_contains($value, 'HEX(AES_ENCRYPT(')) {
            $placeholders[] = $value; // Directly add the expression to placeholders
        } else {
            $placeholders[] = ":$field";
            $boundParams[":$field"] = $value;
        }
    }

    $query = sprintf(
        "INSERT INTO %s (%s) VALUES (%s)",
        $this->query_params['table'],
        implode(',', $fields),
        implode(',', $placeholders)
    );

    try {
        $this->params = [];
        $this->query($query, $boundParams);
    } catch (Exception $e) {
        throw new Exception("Query failed: " . $e->getMessage());
    }
}

# @ DbSqlInterface
public function update() : void {
    if (empty($this->params) || empty($this->query_params['where'])) {
        throw new Exception("Empty parameters or WHERE clause is missing");
    }

    $setClauses = [];
    $boundParams = [];

    foreach ($this->params as $field => $value) {
        if (is_string($value) && str_contains($value, 'HEX(AES_ENCRYPT(')) {
            $setClauses[] = "$field = $value";
        }else {
            $setClauses[] = "$field = :$field";
            $boundParams[":$field"] = $value;
        }
    }
```

```
    $query = sprintf(
        "UPDATE %s SET %s %s",
        $this->query_params['table'],
        implode(',', $setClauses),
        $this->query_params['where']
    );

    try {
        $this->params = [];
        $this->query($query, $boundParams);
    } catch (Exception $e) {
        throw new Exception("Query failed: " . $e->getMessage());
    }
}

# @ DbSqlInterface
public function delete() : void {
    $query = sprintf("DELETE FROM %s %s",
        $this->query_params['table'],
        $this->query_params['where']
    );
    try {
        $this->query($query);
    } catch (Exception $e) {
        throw new Exception("Query failed: " . $e->getMessage());
    }
}

# @ QueryBuilderAbstractSql
public function tableJoin(string $join, ...$tables) : self{
    parent::init('JOIN');

    $upcase = strtoupper($join);
    $implode_join = sprintf(" %s JOIN ",$upcase);
    switch($upcase){
        case 'UNION': # 중복제거
        case 'UNION ALL': # 중복포함
            parent::setQueryTpl('UNINON');
            $implode_join = sprintf(" %s ",$upcase);
            break;
        default :
            parent::setQueryTpl('default');
    }

    $value = implode($implode_join, $tables);
    parent::set('table', $value);
return $this;
}

# @ QueryBuilderAbstractSql
public function select(...$columns) : self{
    $value = implode(',', $columns);
    parent::set('columns', $value);
return $this;
}

# @ QueryBuilderAbstractSql
public function where(...$where) : self
{
    $result = parent::buildWhere($where);
    if($result){
        $value = 'WHERE '.$result;
        parent::set('where', $value);
    }
return $this;
}

# @ QueryBuilderAbstractSql
public function orderBy(...$orderby) : self
{
    $value = 'ORDER BY '.implode(',',$orderby);
    parent::set('orderby', $value);
return $this;
}

# @ QueryBuilderAbstractSql
public function on(...$on) : self
{
    $result = parent::buildWhere($on);
```

```
    if($result){
        $value = 'ON '.$result;
        parent::set('on', $value);
    }
return $this;
}

# @ QueryBuilderAbstractSql
public function limit(...$limit): self {
    $value = 'LIMIT ' . implode(',', $limit);
    parent::set('limit', $value);
    return $this;
}

# @ QueryBuilderAbstractSql
public function distinct(string $column_name) : self{
    $value = sprintf("DISTINCT %s", $column_name);
    parent::set('columns', $value);
return $this;
}

# @ QueryBuilderAbstractSql
public function groupBy(...$columns) : self{
    $value = 'GROUP BY '.implode(',',$columns);
    parent::set('groupby', $value);
return $this;
}

# @ QueryBuilderAbstractSql
public function having(...$having) : self{
    $result = parent::buildWhere($having);
    if($result){
        $value = 'HAVING '.$result;
        parent::set('having', $value);
    }
return $this;
}

# @ QueryBuilderAbstractSql
public function total(string $column_name = '*') : int {
    $value = sprintf("COUNT(%s) AS total_count", $column_name);
    parent::set('columns', $value);
    $query = parent::get();

    $result = $this->query($query);
    $row = $result->fetch_assoc();
    return (int)($row['total_count'] ?? 0);
}

# @ QueryBuilderAbstractSql
public function table(...$tables) : self {
    parent::init('MAIN');
    $length = count($tables);
    $value = ($length == 2) ? $tables[0] . ',' . $tables[1] : $tables[0];
    parent::set('table', $value);
    return $this;
}

# @ QueryBuilderAbstractSql
public function tableSub(...$tables) : self{
    parent::init('SUB');
    $length = count($tables);
    $value = ($length ==2) ? implode(',',$tables) : implode(' ',$tables);
    parent::set('table', $value);
return $this;
}

# @ ArrayAccess
# 사용법 : $obj["two"] = "A value";
public function offsetSet($offset, $value) : void {
    $this->params[$offset] = $value;
}

# @ ArrayAccess
# 사용법 : isset($obj["two"]); -> bool(true)
public function offsetExists($offset) : bool{
    return isset($this->params[$offset]);
}
# @ ArrayAccess
```

```
    # 사용법 : unset($obj["two"]); -> bool(false)
    public function offsetUnset($offset) : void{
        unset($this->params[$offset]);
    }

    # @ ArrayAccess
    # 사용법 : $obj["two"]; -> string(7) "A value"
    public function offsetGet($offset) : mixed{
        return isset($this->params[$offset]) ? $this->params[$offset] : null;
    }

    public function __call($method, $args)
    {
        return call_user_func_array([$this->pdo, $method], $args);
    }

    public function __get(string $propertyName) {
        if(property_exists(__CLASS__,$propertyName)){
            if($propertyName == 'query'){
                return parent::get();
            }else{
                return $this->{$propertyName};
            }
        }
    }
}
```

--- 파일 경로: classes/Db/DbPgSql.php ---

```
<?php
namespace Flex\Banana\Classes\Db;

use Flex\Banana\Classes\Db\QueryBuilderAbstractSql;
use Flex\Banana\Classes\Db\DbResultSql;
use Flex\Banana\Classes\Db\DbInterface;
use \PDO;
use \PDOException;
use \Exception;
use \ArrayAccess;

class DbPgSql extends QueryBuilderAbstractSql implements DbInterface,ArrayAccess
{
    public const __version = '0.1.3';
    private const DSN = "pgsql:host={host};port={port};dbname={dbname}";

    public $pdo;
    private $params = [];
    private array $pdo_options = [
        PDO::ATTR_ERRMODE => PDO::ERRMODE_EXCEPTION,
        PDO::ATTR_DEFAULT_FETCH_MODE => PDO::FETCH_ASSOC
    ];

    public function __construct(
        WhereSql $whereSql
    ){
        parent::__construct($whereSql);
    }

    # @ DbSqlInterface
    public function connect(string $host, string $dbname, string $user, string $password, int $port, string $charset, ?array $options=[]) : self
    {
        try {
            $dsn = $this->bindingDNS(self::DSN, [
                "host"    => $host,
                "dbname"  => $dbname,
                "port"    => $port,
                "charset" => $charset
            ]);
            $this->pdo = new PDO($dsn, $user, $password, $this->pdo_options+$options);
        } catch (PDOException $e) {
            throw new Exception($e->getMessage());
        }

        return $this->selectDB( $dbname );
```

```
}

# @ DbSqlInterface
public function selectDB( string $dbname ): self
{
    $query = "SELECT current_database()";
    $result = $this->pdo->query($query)->fetchColumn();
    if ($result !== $dbname) {
        throw new Exception("Connected to database '$result' instead of '$dbname'");
    }
return $this;
}

# @ DbSqlInterface
public function whereHelper(): WhereSql
{
    return $this->whereSql;
}

# @ DbSqlInterface
public function query(string $query = '', array $params = []): DbResultSql
{
    if (!$query) {
        $query = $this->query = parent::get();
    }

    // echo "Executing query: " . $query . PHP_EOL;
    // print_r($params);

    try {
        $stmt = $this->pdo->prepare($query);
        $result = $stmt->execute($params ?: null);
        if (!$result) {
            throw new Exception("Execution failed: " . implode(", ", $stmt->errorInfo()));
        }

        return new DbResultSql($stmt);
    } catch (PDOException $e) {
        throw new Exception("Query failed: " . $e->getMessage());
    }
}

protected function quoteIdentifier($identifier): string
{
    return '"' . str_replace('"', '""', $identifier) . '"';
}

# @ DbSqlInterface
public function insert() : void {
    if (empty($this->params)) {
        throw new Exception("Empty : params");
    }

    $fields = [];
    $placeholders = [];
    $boundParams = [];

    foreach ($this->params as $field => $value) {
        $fields[] = $field;

        // Check for HEX(AES_ENCRYPT and encode(encrypt_iv
        if (is_string($value) && (str_contains($value, 'encode('))) {
            $placeholders[] = $value; // Directly add the expression to placeholders
        } else {
            $placeholders[] = ":$field";
            $boundParams[":$field"] = $value;
        }
    }

    $query = sprintf(
        "INSERT INTO %s (%s) VALUES (%s)",
        $this->query_params['table'],
        implode(',', $fields),
        implode(',', $placeholders)
    );

    try {
        $this->params = [];
        $this->query($query, $boundParams);
```

```
    } catch (Exception $e) {
        throw new Exception("Query failed: " . $e->getMessage());
    }
}

# @ DbSqlInterface
public function update() : void {
    if (empty($this->params) || empty($this->query_params['where'])) {
        throw new Exception("Empty parameters or WHERE clause is missing");
    }

    $setClauses = [];
    $boundParams = [];

    foreach ($this->params as $field => $value) {
        if (is_string($value) && str_contains($value, 'encode(')) {
            $setClauses[] = "$field = $value";
        }else {
            $setClauses[] = "$field = :$field";
            $boundParams[":$field"] = $value;
        }
    }

    $query = sprintf(
        "UPDATE %s SET %s %s",
        $this->query_params['table'],
        implode(',', $setClauses),
        $this->query_params['where']
    );

    try {
        $this->params = [];
        $this->query($query, $boundParams);
    } catch (Exception $e) {
        throw new Exception("Query failed: " . $e->getMessage());
    }
}

# @ DbSqlInterface
public function delete() : void {
    $query = sprintf("DELETE FROM %s %s",
        $this->query_params['table'],
        $this->query_params['where']
    );
    try {
        $this->query($query);
    } catch (Exception $e) {
        throw new Exception("Query failed: " . $e->getMessage());
    }
}

# @ QueryBuilderAbstract
public function tableJoin(string $join, ...$tables) : self{
    parent::init('JOIN');

    $upcase = strtoupper($join);
    $implode_join = sprintf(" %s JOIN ",$upcase);
    parent::setQueryTpl('default');

    $value = implode($implode_join, $tables);
    parent::set('table', $value);
return $this;
}

# @ QueryBuilderAbstract
public function select(...$columns) : self{
    $value = implode(',', $columns);
    parent::set('columns', $value);
return $this;
}

# @ QueryBuilderAbstract
public function where(...$where) : self
{
    $result = parent::buildWhere($where);
    if($result){
        $value = 'WHERE '.$result;
        parent::set('where', $value);
    }
```

```
return $this;
}

# @ QueryBuilderAbstract
public function orderBy(...$orderby) : self
{
    $value = 'ORDER BY '.implode(',',$orderby);
    parent::set('orderby', $value);
return $this;
}

# @ QueryBuilderAbstract
public function on(...$on) : self
{
    $result = parent::buildWhere($on);
    if($result){
        $value = 'ON '.$result;
        parent::set('on', $value);
    }
return $this;
}

# @ QueryBuilderAbstract
public function limit(...$limit): self {
    $value = match (count($limit)) {
        1 => 'LIMIT ' . $limit[0],
        2 => 'LIMIT ' . $limit[1] . ' OFFSET ' . $limit[0],
        default => throw new Exception("Invalid number of arguments for LIMIT clause")
    };

    parent::set('limit', $value);
    return $this;
}

# @ QueryBuilderAbstract
public function distinct(string $column_name) : self{
    $value = sprintf("DISTINCT %s", $column_name);
    parent::set('columns', $value);
return $this;
}

# @ QueryBuilderAbstract
public function groupBy(...$columns) : self{
    $value = 'GROUP BY '.implode(',',$columns);
    parent::set('groupby', $value);
return $this;
}

# @ QueryBuilderAbstract
public function having(...$having) : self{
    $result = parent::buildWhere($having);
    if($result){
        $value = 'HAVING '.$result;
        parent::set('having', $value);
    }
return $this;
}

# @ QueryBuilderAbstract
public function total(string $column_name = '*') : int {
    $value = sprintf("COUNT(%s) AS total_count", $column_name);
    parent::set('columns', $value);
    $query = parent::get();

    $result = $this->query($query);
    $row = $result->fetch_assoc();
    return (int)($row['total_count'] ?? 0);
}

# @ QueryBuilderAbstract
public function table(...$tables) : self {
    parent::init('MAIN');
    $length = count($tables);
    $value = ($length == 2) ? $tables[0] . ',' . $tables[1] : $tables[0];
    parent::set('table', $value);
    return $this;
}

# @ QueryBuilderAbstract
```

```
    public function tableSub(...$tables) : self{
        parent::init('SUB');
        $length = count($tables);
        $value = ($length ==2) ? implode(',',$tables) : implode(' ',$tables);
        parent::set('table', $value);
    return $this;
    }

    # @ ArrayAccess
    # 사용법 : $obj["two"] = "A value";
    public function offsetSet($offset, $value) : void {
        $this->params[$offset] = $value;
    }

    # @ ArrayAccess
    # 사용법 : isset($obj["two"]); -> bool(true)
    public function offsetExists($offset) : bool{
        return isset($this->params[$offset]);
    }

    # @ ArrayAccess
    # 사용법 : unset($obj["two"]); -> bool(false)
    public function offsetUnset($offset) : void{
        unset($this->params[$offset]);
    }

    # @ ArrayAccess
    # 사용법 : $obj["two"]; -> string(7) "A value"
    public function offsetGet($offset) : mixed{
        return isset($this->params[$offset]) ? $this->params[$offset] : null;
    }

    public function __call($method, $args)
    {
        return call_user_func_array([$this->pdo, $method], $args);
    }

    public function __get(string $propertyName) {
        if(property_exists(__CLASS__,$propertyName)){
            if($propertyName == 'query'){
                return parent::get();
            }else{
                return $this->{$propertyName};
            }
        }
    }
}
```

--- 파일 경로: classes/Db/DbResultCouch.php ---

```
<?php
namespace Flex\Banana\Classes\Db;

class DbResultCouch {
    private $result;
    private $docs;
    private $currentIndex;
    private $numRows;

    public function __construct(string|array $result) {
        if(!is_array($result)){
            try {
                $result = json_decode($result, true);
            }catch (\JsonException $e) {
            }
        }
        $this->result = $result;

        $this->docs = $this->result['body']['docs'] ?? [];
        $this->currentIndex = 0;
        $this->numRows = count($this->docs);
    }

    public function fetch_assoc() {
```

```
        if ($this->currentIndex < $this->numRows) {
            return $this->docs[$this->currentIndex++];
        }
        return false;
    }

    public function fetch_array() {
        if ($this->currentIndex < $this->numRows) {
            $doc = $this->docs[$this->currentIndex++];
            return array_merge($doc, array_values($doc));
        }
        return false;
    }

    public function fetch_row() {
        if ($this->currentIndex < $this->numRows) {
            return array_values($this->docs[$this->currentIndex++]);
        }
        return false;
    }

    public function fetch_object() {
        if ($this->currentIndex < $this->numRows) {
            return (object)$this->docs[$this->currentIndex++];
        }
        return false;
    }

    public function num_rows() {
        return $this->numRows;
    }

    public function fetch_all() {
        return array_map(function($doc) {
            return array_merge($doc, array_values($doc));
        }, $this->docs);
    }

    public function fetch_column($column = 0) {
        if ($this->currentIndex < $this->numRows) {
            $doc = $this->docs[$this->currentIndex++];
            $values = array_values($doc);
            return isset($values[$column]) ? $values[$column] : null;
        }
        return false;
    }

    // CouchDB 특화 메서드
    public function get_bookmark() {
        return $this->result['bookmark'] ?? null;
    }

    public function get_warning() {
        return $this->result['warning'] ?? null;
    }

    public function get_execution_stats() {
        return $this->result['execution_stats'] ?? null;
    }
}
```

--- 파일 경로: classes/Db/DbResultSql.php ---

```
<?php
namespace Flex\Banana\Classes\Db;

use PDO;
use PDOStatement;

class DbResultSql {
    private $statement;
    private $resultSet;
    private $currentRow;
    private $numRows;
```

```
    public function __construct(PDOStatement $statement) {
        $this->statement = $statement;
        $this->resultSet = null;
        $this->currentRow = 0;
        $this->numRows = $statement->rowCount();
    }

    public function fetch_assoc() {
        return $this->statement->fetch(PDO::FETCH_ASSOC);
    }

    public function fetch_array($resultType = PDO::FETCH_BOTH) {
        return $this->statement->fetch($resultType);
    }

    public function fetch_row() {
        return $this->statement->fetch(PDO::FETCH_NUM);
    }

    public function fetch_object() {
        return $this->statement->fetch(PDO::FETCH_OBJ);
    }

    public function num_rows() {
        return $this->numRows;
    }

    public function fetch_all($resultType = PDO::FETCH_ASSOC) {
        if ($this->resultSet === null) {
            $this->resultSet = $this->statement->fetchAll($resultType);
        }
        return $this->resultSet;
    }

    public function fetch_column($column = 0) {
        return $this->statement->fetchColumn($column);
    }
}
```

--- 파일 경로: classes/Db/QueryBuilderAbstractCouch.php ---

```
<?php
namespace Flex\Banana\Classes\Db;

use Flex\Banana\Classes\Db\WhereCouch;
use Flex\Banana\Classes\Log;
abstract class QueryBuilderAbstractCouch
{
    public const __version = '0.0.2';
    protected array $query_params;

    protected const _QUERY_INIT_PARAMS_ = [
        'selector'  => ["_id" => ['$gt' => null]],
        'fields'    => [],
        'sort'      => [],
        'limit'     => null,
        'skip'      => null,
        'use_index' => null
    ];

    public function __construct(
        protected WhereCouch $whereCouch
    )
    {
        $this->init();
    }

    abstract public function table(...$tables) : mixed;
    abstract public function select(...$columns) : mixed;
    abstract public function where(...$where) : mixed;
    abstract public function orderBy(...$orderby) : mixed;
    abstract public function limit(...$limit) : mixed;
    abstract public function total(string $column_name) : int;
    abstract public function useIndex(...$index): self;
```

```
    public function init(): void
    {
        $this->query_params = self::_QUERY_INIT_PARAMS_;
    }

    public function set(string $key, $value): void
    {
        if($key == 'selector'){
            $this->query_params[$key] = new \stdClass();
        }
        $this->query_params[$key] = $value;
    }

    public function get(): array
    {
        $query = [];
        foreach ($this->query_params as $key => $value) {
            if ($value !== null) {
                if($key == 'sort'){
                    if(!empty($this->query_params[$key])){
                        $query[$key] = $value;
                    }
                }else $query[$key] = $value;
            }
        }

        return $query;
    }

    public function bindingDNS (string $tpl, array $dsn_options) : string
    {
        preg_match_all("/({+)(.*?)(})/", $tpl, $matches);
        $patterns = $matches[0];
        $columns  = $matches[2];

        # binding
        foreach($patterns as $idx => $text){
            $column_name = $columns[$idx];
            $render_args[$text] = (trim($dsn_options[$column_name])) ? $dsn_options[$column_name] :'';
        }
        return trim(strtr($tpl, $render_args));
    }

    protected function buildWhere(array $conditions): array
    {
        $this->whereCouch->__construct();
        $this->whereCouch->begin('and');
        if (is_array($conditions) && count($conditions) >= 2) {
            if (count($conditions) == 2) {
                $this->whereCouch->case($conditions[0], '=', $conditions[1]);
            } elseif (count($conditions) == 3) {
                $this->whereCouch->case($conditions[0], $conditions[1], $conditions[2]);
            }
        }
        $this->whereCouch->end();
        return $this->whereCouch->__get('where');
    }
}
```

--- 파일 경로: classes/Db/QueryBuilderAbstractSql.php ---

```
<?php
namespace Flex\Banana\Classes\Db;

use Flex\Banana\Classes\Db\WhereSql;

# purpose : 각종 SQL 관련 디비를 통일성있게  작성할 수 있도록 틀을 제공
abstract class QueryBuilderAbstractSql
{
    public const __version = '1.5.3';
    private string $query_mode;
    protected array $query_params;
    private array $sub_query_params;
    private string $query_tpl = '';
```

```
private array $tpl = [
    'union'   => '{table}{where}{groupby}{having}{orderby}{limit}',
    'default' => 'SELECT {columns}FROM {table}{on}{where}{groupby}{having}{orderby}{limit}'
];
protected string $query = '';
const _QUERY_INIT_PARAMS_ = ['columns'=>'*','table'=>'','where'=>'','orderby'=>'','on'=>'','limit'=>'','groupby'=>'','having'=>''];

abstract public function table(...$tables) : mixed;
abstract public function tableJoin(string $type,...$tables) : mixed;
abstract public function tableSub(...$tables) : mixed;
abstract public function select(...$columns) : mixed;
abstract public function where(...$where) : mixed;
abstract public function orderBy(...$orderby) : mixed;
abstract public function on(...$on) : mixed;
abstract public function limit(...$limit) : mixed;
abstract public function distinct(string $column_name) : mixed;
abstract public function groupBy(...$columns) : mixed;
abstract public function having(...$columns) : mixed;
abstract public function total(string $column_name) : int;

public function __construct(
    protected WhereSql $whereSql
)
{
    $this->init();
}

public function init(string $type = 'main') : void
{
    $this->query_mode = strtoupper($type);

    if($this->query_mode == 'JOIN'){
        $this->sub_query_params = [];
        $this->query_params = [];
        $this->query_params = self::_QUERY_INIT_PARAMS_;
    }
    else if($this->query_mode == 'SUB'){
        $this->query_tpl =  $this->tpl['default'];
        $this->sub_query_params = [];
        $this->sub_query_params = self::_QUERY_INIT_PARAMS_;
    }else {
        $this->sub_query_params = [];
        $this->query_params = [];
        $this->query_params = self::_QUERY_INIT_PARAMS_;
        $this->query_tpl =  $this->tpl['default'];
    }
}

public function setQueryTpl (string $tpl_mode){
    $upcase = strtoupper($tpl_mode);
    if($upcase == 'UNINON') $this->query_tpl = $this->tpl['union'];
    else $this->query_tpl = $this->tpl['default'];
}

public function set(string $style, string $value) : void {
    if($this->query_mode == 'SUB') $this->sub_query_params[$style] = $value;
    else $this->query_params[$style] = $value;
}

public function get() : string
{
    preg_match_all("/({+)(.*?)(})/", $this->query_tpl, $matches);
    $patterns = $matches[0];
    $columns  = $matches[2];

    $render_args  = [];
    $query_params = [];
    $query_params = ($this->query_mode == 'SUB') ? $this->sub_query_params : $this->query_params;

    # binding
    foreach($patterns as $idx=>$text){
        $column_name = $columns[$idx];
        $render_args[$text] = (trim($query_params[$column_name])) ? $query_params[$column_name].' ':'';
    }
    $this->query = trim(strtr($this->query_tpl, $render_args));

    # reset
    if($this->query_mode == 'SUB' || $this->query_mode == 'JOIN') {
        $this->query_mode = 'MAIN';
```

```
        }
    return $this->query;
    }

    public function bindingDNS (string $tpl, array $dsn_options) : string
    {
        preg_match_all("/({+)(.*?)(})/", $tpl, $matches);
        $patterns = $matches[0];
        $columns  = $matches[2];

        # binding
        foreach($patterns as $idx => $text){
            $column_name = $columns[$idx];
            $render_args[$text] = (trim($dsn_options[$column_name])) ? $dsn_options[$column_name] :'';
        }
        return trim(strtr($tpl, $render_args));
    }

    public function buildWhere(...$w) : string
    {
        $result = '';
        $length = (isset($w[0])) ? count($w[0]) : 0;
        if($length > 0)
        {
            $wa = $w[0];
            if(isset($wa[0]) && $wa[0])
            {
                $result = $wa[0];
                if($length > 1)
                {
                    $this->whereSql->__construct();
                    # 배열
                    if(is_array($wa[0]))
                    {
                        $this->whereSql->begin('AND');
                        foreach($wa as $idx => $argv)
                        {
                            $argv_length = count($argv);
                            if($argv_length ==2){
                                $this->whereSql->case($argv[0], '=', $argv[1]);
                            }else if($argv_length ==3){
                                $this->whereSql->case($argv[0], $argv[1], $argv[2]);
                            }
                        }
                        $this->whereSql->end();
                    }else{ # string
                        if($length ==2){
                            $this->whereSql->begin('AND')->case($wa[0], '=', $wa[1])->end();
                        }else if($length ==3){
                            $this->whereSql->begin('AND')->case($wa[0], $wa[1], $wa[2])->end();
                        }
                    }
                    $result = $this->whereSql->__get('where');
                }
            }
        }
    return $result;
    }
}
```

--- 파일 경로: classes/Db/WhereCouch.php ---

```
<?php
namespace Flex\Banana\Classes\Db;

use Flex\Banana\Classes\Db\WhereInterface;
use Flex\Banana\Classes\Log;

# 데이터베이스 QUERY구문에 사용되는 WHERE문 만드는데 도움을 주는 클래스
class WhereCouch implements WhereInterface
{
    public const __version = '0.1.0';
    private array $where_group = [];
    private string $current_group = '';
```

```
private string $current_coord = '';
private array $where_groups_data = [];
private string $coord = 'AND'; # 전체 그룹을 마지막으로 묶을 coord

# void
# @fields : name+category+area 복수필드
# @coord : [AND | OR]
public function __construct(string $coord = 'AND')
{
    $this->coord = $coord;
    $this->init();
}

# where 그룹묶기 시작
public function begin(string $coord) : WhereCouch
{
    // Log::d(__CLASS__,__METHOD__, $coord);
    $groupname = strtr(microtime(),[' '=>'','0.'=>'w']);
    if(!isset($this->where_group[$groupname])){
        $this->where_group[$groupname] = [];
    }

    # end 자동닫기
    if($this->current_group){
        $this->end();
    }

    # 현재그룹 시작
    $this->current_group = $groupname;
    $this->current_coord = $coord;
return $this;
}

# where 그룹묶기 종료
public function end() : WhereCouch
{
    // Log::d(__METHOD__,$this->where_group);
    // 현재 그룹에 조건이 있으면
    if (count($this->where_group[$this->current_group])) {
        // 조건을 배열로 저장
        $group_conditions = ['$' . strtolower($this->current_coord) => []];
        foreach ($this->where_group[$this->current_group] as $condition) {
            $group_conditions['$' . strtolower($this->current_coord)][] = $condition;
        }
        // 조건을 and, or로 구분하여 추가
        $this->where_groups_data[]=$group_conditions;
    }

    // 현재 그룹과 coord 초기화
    $this->current_group = '';
    $this->current_coord = '';

    return $this;
}

# void
# 구문어를 만든다.
# @where_str : name='홍길동'
# @condition : [=,!=,<,>,<=,>=,IN,LIKE-R=dd%,LIKE-L=%dd,LIKE=%dd%]
# @value : NULL | VALUE | % | Array
public function case(string $field_name, string $condition ,mixed $value, bool $is_qutawrap=true, bool $join_detection=true) : WhereCouch
{
    // Log::d(__METHOD__);
    $is_append = false;
    if($value == "0") $is_append = true;
    else if($value && $value !=''){
        $is_append = true;
    }

    # where 문을 그룹별로 묶기
    if($is_append)
    {
        $in_value = [];
        if (is_array($value)){ // array
            $in_value = $value;
        } else if (strpos($value, ",") !==false){
            $in_value = explode(',', $value);
        } else{
            $in_value[] = $value;
```

```
        }

        $condition = strtolower($condition);
        if($condition == 'like' || $condition == 'like-r' || $condition == 'like-l'){
            foreach($in_value as $word)
            {
                // $_word = preg_replace("/[#\&\+\-%@=\/\\\:;,\.\'\"\^`~\_|\!\?\*$#<>()\[\]\{\}]/i"," ",$word);
                $_word = preg_replace("/[#\&\+%@=\/\\;,\'\"\^`~|\!\?\*$#<>()\[\]\{\}]/i"," ",$word);

                $this->where_group[$this->current_group][][$field_name] = [
                    '$regex' => $this->buildRegexForLike($condition, $_word)
                ];
            }
        }
        else if($value == 'null'){
            $this->where_group[$this->current_group][][$field_name] = null;
        }
        else{
            // 다른 조건 처리
            if (count($in_value) === 1) {
                // 단일 값일 경우
                $this->where_group[$this->current_group][][$field_name] = [
                    $this->mapConditionToOperator($condition) => $in_value[0] // 단일 값 사용
                ];
            } else {
                // 다수의 값일 경우 (IN 조건)
                $this->where_group[$this->current_group][][$field_name] = [
                    $this->mapConditionToOperator($condition) => $in_value
                ];
            }
        }
    }
return $this;
}

# 상속한 부모 프라퍼티 값 포함한 가져오기
public function __get($propertyName)
{
    // Log::d(__METHOD__,$propertyName);
    if ($propertyName == 'where')
    {
        // 아직 종료되지 않은 그룹이 있으면 종료
        if ($this->current_group) {
            $this->end();
        }

        // Log::d('where_groups_data',$this->where_groups_data);

        // 그룹 데이터를 배열로 리턴
        $result = [];
        if(count($this->where_groups_data) > 1){
            $_coord = '$' . strtolower($this->coord);
            $result = [$_coord => $this->where_groups_data];
        }else{
            $result = (isset($this->where_groups_data[0])) ? $this->where_groups_data[0] : $this->where_groups_data;
        }
        $this->init();
        return $result;
    }else{
        return $this->{$propertyName};
    }
}

private function mapConditionToOperator(string $condition): string
{
    return match ($condition) {
        '=' => '$eq',
        '!=' => '$ne',
        '<' => '$lt',
        '<=' => '$lte',
        '>' => '$gt',
        '>=' => '$gte',
        'in' => '$in',
        'not in' => '$nin',
        default => '$eq'
    };
}

private function buildRegexForLike(string $condition, string $value): string
```

```
    {
        $value = preg_quote($value, '/');
        return match ($condition) {
            'like'   => ".*$value.*",
            'like-r' => "$value.*",
            'like-l' => ".*$value",
            default  => $value,
        };
    }

    # 초기화
    private function init() : void {
        $this->current_group = '';
        $this->current_coord = '';
        $this->where_group   = [];
        $this->where_groups_data = [];
    }

    public function fetch() : array
    {
        if ($this->current_group) {
            $this->end();
        }
        $result = $this->where_group;
        $this->init();
    return $result;
    }


    public function __destruct(){
        $this->current_group     = '';
        $this->current_coord     = '';
        $this->where_group       = [];
        $this->where_groups_data =  [];
    }
}
```

--- 파일 경로: classes/Db/WhereHelper.php ---

```
<?php
namespace Flex\Banana\Classes\Db;

use Flex\Banana\Classes\Db\WhereInterface;
use \ReflectionClass;
use \Exception;

class WhereHelper
{
    public const __version = '1.0.1';

    private $processor;
    private static $allowedProcessors = [
        WhereSql::class,
        WhereCouch::class,
    ];

    public function __construct($processor)
    {
        $this->setProcessor($processor);
    }

    private function setProcessor($processor): void
    {
        $reflection = new ReflectionClass($processor);
        if (!in_array($reflection->getName(), self::$allowedProcessors)) {
            throw new Exception("Unsupported processor type: " . $reflection->getName());
        }

        $this->processor = $processor;
    }

    public function case(string $field_name, string $condition, mixed $value, bool $is_qutawrap = true, bool $join_detection = true): self{
        $this->processor->case($field_name, $condition, $value, $is_qutawrap, $join_detection);
        return $this;
```

```
    }
    public function begin(string $coord): self{
        $this->processor->begin($coord);
        return $this;
    }
    public function end(): self{
        $this->processor->end();
        return $this;
    }
    public function fetch(): array{
        return $this->processor->fetch();
    }

    public function __call($name, $arguments)
    {
        $reflection = new ReflectionClass($this->processor);
        if ($reflection->hasMethod($name)) {
            $method = $reflection->getMethod($name);
            if ($method->isPublic()) {
                return $method->invokeArgs($this->processor, $arguments);
            }
        }

        // 프로세서의 __call 메소드 호출
        if ($reflection->hasMethod('__call')) {
            return $this->processor->__call($name, $arguments);
        }

        throw new Exception("Method $name does not exist in " . get_class($this->processor));
    }

    public function __get($propertyName) : mixed
    {
        return $this->processor->__get($propertyName);
    }

    public function __destruct()
    {
        $this->processor->__destruct();
    }

    public static function addProcessor(string $processorClass): void
    {
        if (!class_exists($processorClass)) {
            throw new Exception("Class $processorClass does not exist");
        }

        if (!in_array($processorClass, self::$allowedProcessors)) {
            self::$allowedProcessors[] = $processorClass;
        }
    }

    public static function getAllowedProcessors(): array
    {
        return self::$allowedProcessors;
    }
}
```

--- 파일 경로: classes/Db/WhereInterface.php ---

```
<?php
namespace Flex\Banana\Classes\Db;

interface WhereInterface {
    public function __construct(string $coord = 'AND');
    public function case(string $field_name, string $condition, mixed $value, bool $is_qutawrap = true, bool $join_detection = true): self;
    public function begin(string $coord): self;
    public function end(): self;
    public function fetch(): array;
    public function __get($propertyName);
}
```

--- 파일 경로: classes/Db/WhereSql.php ---

```php
<?php
namespace Flex\Banana\Classes\Db;

use Flex\Banana\Classes\Db\WhereInterface;
use Flex\Banana\Classes\Log;
# 데이터베이스 QUERY구문에 사용되는 WHERE문 만드는데 도움을 주는 클래스
class WhereSql implements WhereInterface
{
    public const __version = '2.0';
    private string $where = '';
    private array $where_group = [];
    private string $current_group = '';
    private string $current_coord = '';
    private array $where_groups_data = [];
    private string $coord = 'AND'; # 전체 그룹을 마지막으로 묶을 coord

    # void
    # @fields : name+category+area 복수필드
    # @coord : [AND | OR]
    public function __construct(string $coord = 'AND')
    {
        $this->where = '';
        $this->coord = $coord;
        $this->init();
    }

    # void
    # 구문어를 만든다.
    # @where_str : name='홍길동'
    # @condition : [=,!=,<,>,<=,>=,IN,LIKE-R=dd%,LIKE-L=%dd,LIKE=%dd%]
    # @value : NULL | VALUE | % | Array
    public function case(string $field_name, string $condition ,mixed $value, bool $is_qutawrap=true, bool $join_detection=true) : WhereSql
    {
        $is_append = false;
        if($value == "0") $is_append = true;
        else if($value && $value !=''){
            $is_append = true;
        }

        # where 문을 그룹별로 묶기
        if($is_append)
        {
            $in_value = [];
            if (is_array($value)){ // array
                $in_value = $value;
            } else if (strpos($value, ",") !==false){
                $in_value = explode(',', $value);
            } else{
                $in_value[] = $value;
            }

            $_uppper_condition = strtoupper($condition);
            if($_uppper_condition == 'LIKE' || $_uppper_condition == 'LIKE-R' || $_uppper_condition == 'LIKE-L'){
                foreach($in_value as $n => $word)
                {
                    // $_word = preg_replace("/[#\&\+\-%@=\/\\\:;,\.'\"\^`~\_|\!\?\*$#<>()\[\]\{\}]/i",' ',$word);
                    $_word = preg_replace("/[#\&\+%@=\/\\\;,'\"\^`~|\!\?\*$#<>()\[\]\{\}]/i",' ',$word);

                    // append
                    $this->where_group[$this->current_group][] = match($_uppper_condition) {
                        'LIKE' => sprintf("'%s LIKE '%%%s%%'", $field_name, $_word),
                        'LIKE-R' => sprintf("'%s LIKE '%s%%'", $field_name, $_word),
                        'LIKE-L' => sprintf("'%s LIKE '%%%s'", $field_name, $_word),
                    };
                }
            }
            else if($_uppper_condition == 'IN' || $_uppper_condition == 'NOT IN'){
                if(strpos($in_value[0],'.') !==false){
                    $in_value_str = implode ( ",", $in_value );
                }else{
                    $in_value_str = ($is_qutawrap) ? "'" . implode ( "', '", $in_value ) . "'" : implode ( ",", $in_value );
                }

                // append
                $this->where_group[$this->current_group][] = sprintf("'%s %s (%s)", $field_name, $_uppper_condition, $in_value_str);
            }
```

```
        else if($_uppper_condition == 'JSON_CONTAINS'){
            $in_value_str = json_encode($in_value, JSON_UNESCAPED_UNICODE);

            // append
            $this->where_group[$this->current_group][] = sprintf("JSON_CONTAINS(%s, '%s')", $field_name, $in_value_str);
        }
        else if($value == 'NULL'){
            // append
            $this->where_group[$this->current_group][] = sprintf("'%s %s %s", $field_name, $condition, $value);
        }
        else{
            // set "a.name 형태인지 체크"
            $__value__ = ($is_qutawrap) ? sprintf("'%s'",$in_value[0]) : $in_value[0];
            $d_value = sprintf("'%s %s %s", $field_name, $condition, $__value__);
            if($join_detection)
            {
                $pattern = "/^([a-zA-Z0-9]|_)+(\.)([a-zA-Z0-9]|_)/i";
                if(preg_match($pattern, $in_value[0])){
                    $d_value = sprintf("%s %s %s", $field_name, $condition, $in_value[0]);
                }
            }

            $this->where_group[$this->current_group][] = $d_value;
        }
    }
return $this;
}

# 상속한 부모 프라퍼티 값 포함한 가져오기
public function __get($propertyName){
    if($propertyName == 'where'){
        #아직 종료되지 않은 begin end가 있는지 체크
        if($this->current_group){
            $this->end();
        }
        $this->where = (count($this->where_groups_data)) ? "(" . implode ( ") {$this->coord} (", $this->where_groups_data ) . ")" : '';
        $this->init();
    }

    return $this->{$propertyName};
}

# 초기화
private function init() : void {
    $this->current_group = '';
    $this->current_coord = '';
    $this->where_group   = [];
    $this->where_groups_data = [];
}

public function fetch() : array
{
    $result = $this->where_group;
    $this->init();
return $result;
}

# where 그룹묶기 시작
public function begin(string $coord) : WhereSql
{
    $groupname = strtr(microtime(),[' '=>'','0.'=>'w']);
    $this->where_group[$groupname] = [];

    # end 자동닫기
    if($this->current_group){
        $this->end();
    }

    # 현재그룹 시작
    $this->current_group = $groupname;
    $this->current_coord = $coord;
return $this;
}

# where 그룹묶기 종료
public function end() : WhereSql{
    if(count($this->where_group[$this->current_group])){
        $wher_str = implode(sprintf(" %s ", $this->current_coord), $this->where_group[$this->current_group]);
        $this->where_groups_data[] = $wher_str;
```

```
        }

        # 현재그룹 시작
        $this->current_group = '';
        $this->current_coord = '';
    return $this;
    }

    public function __destruct(){
        $this->where            = '';
        $this->current_group    = '';
        $this->current_coord    = '';
        $this->where_group      = [];
        $this->where_groups_data =  [];
    }
}
```

--- 파일 경로: classes/Dir/DirInfo.php ---

```
<?php
namespace Flex\Banana\Classes\Dir;

# purpose : 디렉토리 관련
class DirInfo
{
    public const __version = '1.1.0';
    public string $directory;
    const permission    = 0707;

    public function __construct(string $dir)
    {
        $this->directory = $dir;
    }

    # 복수 폴더 만들기
    public function makesDir() : void
    {
        if(strpos($this->directory, '/') !==false)
        {
            $dir_args = explode('/', $this->directory);
            $current_dir = _ROOT_PATH_;
            if(is_array($dir_args)){
                foreach($dir_args as $folder){
                    $current_dir = $current_dir.'/'.$folder;
                    if(!$this->isDir($current_dir)){
                        if(!mkdir($current_dir,self::permission)) throw new \Exception('e_filenotfound');
                        if(!chmod($current_dir,self::permission)) throw new \Exception('e_filenotfound');
                    }
                }
            }
        }
    }

    # 폴더 만들기
    public function makeDirectory(string $dir) : bool
    {
        $result = true;
        $directory = $this->directory.'/'.$dir;
        # compile_dirname 폴더 이전 경로 생성
        if(!$this->isDir($directory)){
            if(!mkdir($directory,self::permission)) $result= false;
            if(!chmod($directory,self::permission)) $result= false;
            #if(!@chown($chkpath,getmyuid())) $result= false; break;
        }
    return $result;
    }

    # 디렉토리인지 확인
    protected function isDir(string $dir) : bool{
        if(!is_dir($dir)) return false;
    return true;
    }
}
```

--- 파일 경로: classes/Dir/DirObject.php ---

```php
<?php
namespace Flex\Banana\Classes\Dir;

use Flex\Banana\Classes\Dir\DirInfo;

# 디렉토리 목록 및 디렉토리에 해달하는 파일 가져오기
class DirObject extends DirInfo
{
    public const __version = '1.2';

    public function __construct(string $dir){
        parent::__construct($dir);
    }

    #@ return array
    # 특정폴더안에 있는 모든 파일 및 폴더명을 넘겨받는다.
    # nothing = array("","gif","html")"포함 시키고 쉽지 않은 폴더 제외 및 파일명 제외"
    public function findFiles(string $pattern='*', Array $nothing=array()) : Array
    {
        $result = array();
        $files= glob($this->directory.DIRECTORY_SEPARATOR.$pattern);
        if(is_array($files))
        {
            foreach($files as $filename){
                if (is_file($filename)){
                    $short_filename = basename($filename);
                    $count= strrpos($short_filename,'.');
                    $file_extension= strtolower(substr($short_filename, $count+1));
                    if(!in_array($file_extension, $nothing)) $result[] = $short_filename;
                }
            }
        }
    return $result;
    }

    #@ return array
    # 특정폴더안에 있는 모든 폴더명을 넘겨받는다.
    # nothing = array("디렉토리명")"포함 시키고 쉽지 않은 폴더 제외"
    public function findFolders(Array $nothing=array()) : Array
    {
        $result = array();
        $dirs= glob($this->directory.DIRECTORY_SEPARATOR.'*', GLOB_ONLYDIR);
        if(is_array($dirs))
        {
            foreach($dirs as $dirname){
                if ($this->isDir($dirname)){
                    $short_dirname = basename($dirname);
                    if(!in_array($short_dirname, $nothing)) $result[] = $short_dirname;
                }
            }
        }
    return $result;
    }
}
```

--- 파일 경로: classes/Enum/EnumValueStorage.php ---

```php
<?php
namespace Flex\Banana\Classes\Enum;

class EnumValueStorage
{
    private static array $values = [];

    public static function setValue(string $enumClass, string $key, $value): void
    {
        self::$values[$enumClass][$key] = $value;
```

```
    }

    public static function getValue(string $enumClass, string $key)
    {
        return self::$values[$enumClass][$key] ?? null;
    }

    public static function getValues(string $enumClass): array
    {
        return self::$values[$enumClass] ?? [];
    }

    public static function reset(string $enumClass): void
    {
        self::$values[$enumClass] = [];
    }
}
```

--- 파일 경로: classes/File/Download.php ---

```
<?php
namespace Flex\Banana\Classes\File;

use Flex\Banana\Classes\File\FileSize;

# parnet :
# purpose : 파일다운로드
final class Download extends FileSize
{
    public const __version = '1.1';

    # 다운로드 허용 확장자
    private array $allowed_filetypes = ['pdf','xls','xlsx','doc','docx','zip','hwp','ppt','pptx','jpg','jpeg','png','gif'];
    public string $file_extension    = '';
    private string $title = '';
    private array $headers           = [
        'Content-type'              => 'application/octet-stream',
        'Cache-control'             => 'private',
        "Content-Transfer-Encoding" => "binary",
        "Pragma"                    => "no-cache"
    ];

    final public function __construct(string $filenamez){
        parent::__construct($filenamez);
        $this->getExtName();
    }

    # 파일 확장자 추출
    private function getExtName() : void{
        $tmpfile = basename($this->filename);
        $count   = strrpos($tmpfile,'.');
        $this->file_extension = strtolower(substr($tmpfile, $count+1));
    }

    # 다운로드 허용 파일 확장자 등록
    public function setFileTypes(array $allowed_filetypes = []) : Download
    {
        if(count($allowed_filetypes)){
            $this->allowed_filetypes = $allowed_filetypes;
        }
    return $this;
    }

    public function getContents () : string
    {
        # 다운로드 허용 파일인지 체크
        if(!in_array($this->file_extension,$this->allowed_filetypes)){
            throw new \Exception( 'e_extension_not_allowed');
        }

        return file_get_contents($this->filename);
    }

    public function __get(string $propertyName) : mixed
```

```
    {
        $result = [];
        if(property_exists(__CLASS__,$propertyName)){
            if($propertyName == 'headers'
                || $propertyName == 'allowed_filetypes'
                || $propertyName == 'title'){
                $result = $this->{$propertyName};
            }
        }
    return $result;
    }

    # header 값 추가 및 변경
    public function __set(string $propertyName, mixed $propertyValue) : void
    {
        if(property_exists(__CLASS__,$propertyName)){
            if($propertyName == 'headers'){
                if(is_array($propertyValue)){
                    $this->headers = array_merge($this->headers, $propertyValue);
                }
            }
        }
    }

    # 다운로드파일명 설정
    public function setFileName (string $title) : Download {
        $this->title = $title;
        $this->headers['Content-Disposition'] = sprintf('attachment;filename="%s"', $title);
    return $this;
    }

    public function download() : void
    {
        # file contents
        $file_contents = $this->getContents ();

        # header
        $headers = [];
        foreach($this->headers as $hkey => $hval)
        {
            # header content
            $headerstring = sprintf("%s:%s", $hkey, $hval);

            # append
            $headers[] = $headerstring;
        }

        # output
        foreach($this->headers as $_header){
            header($_header);
        }

        # 출력
        echo $file_contents;
    }
}
```

--- 파일 경로: classes/File/FileRemove.php ---

```
<?php
namespace Flex\Banana\Classes\File;

use Flex\Banana\Classes\Dir\DirObject;

# purpose : 파일삭제
final class FileRemove extends DirObject
{
    public const __version = '1.1';

    public array $list = [];

    final function __construct(string $dir) {
        parent::__construct($dir);
    }
```

```
    # 디렉토리내 파일 찾기
    public function find (string $pattern, array $nothing=['html','md','php']) : FileRemove
    {
        # 디렉토리인지 체크
        if($this->isDir($this->directory)){
            $this->list = $this->findFiles($pattern,$nothing);
        }

    return $this;
    }

    # 파일삭제
    public function remove() : void
    {
        if(count($this->list))
        {
            foreach($this->list as $filename){
                unlink($this->directory.'/'.$filename) or throw new \Exception('e_file_deletion_failed');
            }
        }
    }

    public function __get(string $propertyName){
        $result = [];
        if(property_exists($this,$propertyName)){
            $result = $this->{$propertyName};
        }
    return $result;
    }
}
```

--- 파일 경로: classes/File/FileSize.php ---

```
<?php
namespace Flex\Banana\Classes\File;

use \Exception;

# 파일 용량을 알아보기 쉽도록 변환
class FileSize
{
    public const __version = '1.0';
    protected string $filename;
    protected $filesize_bytes = 0;
    private array $convert_type = array('B', 'Kb', 'MB', 'GB', 'TB', 'PB');

    #@ void
    # 파일전체 경로
    public function __construct(string $filenamez=''){
        if($filenamez){
            if(!$filenamez) throw new Exception( 'e_filenotfound' );
            if(!file_exists($filenamez)) throw new Exception( 'e_filenotfound');

            $this->filename = $filenamez;
            $this->filesize_bytes = filesize($this->filename);
        }
    }

    # 파일사이즈 등록
    public function setBytes(int $bytes) : FileSize{
        if(!empty($bytes))
            $this->filesize_bytes = $bytes;

    return $this;
    }

    #@ 바이트 단위로
    private function bytes() : int{
        return $this->filesize_bytes;
    }

    #@ 문자 단위로
    private function size() : string{
        $result = "0";
```

```
        if(!empty($this->filesize_bytes)){
            $e = floor(log($this->filesize_bytes)/log(1024));
            $result = sprintf('%.2f %s', ($this->filesize_bytes/pow(1024, floor($e))), $this->convert_type[$e]);
        }
    return $result;
    }

    public function __call(string $method, array $params = []) : mixed {
        $result = '';
        if(!method_exists($this, $method)){
            throw new Exception( 'e_not_found_method');
        }

        $result = match($method){
            'bytes'  => $this->bytes(),
            'size' => $this->size()
        };

    return $result;
    }
}
```

--- 파일 경로: classes/File/Storage.php ---

```
<?php
namespace Flex\Banana\Classes\File;

use \SplFileObject;

# 파일을 이용한 스토리지 데이타 관리
class Storage extends SplFileObject
{
    public const __version = '1.0.3';
    protected $file_name = '';
    private $open_mode;

    public function __construct ( string $file_name, string $mode ){
        $this->file_name = $file_name;
        $this->open_mode = $mode;
        parent::__construct($this->file_name, $this->open_mode);
        if (parent::isFile()) {
            $this->file_name = parent::getRealPath();
        }
    }

    #@ 파일쓰기
    public function write(string $context) : int|bool{
        $written=0;
        if(parent::isWritable()){
            $written = parent::fwrite($context);
        }
    return $written;
    }

    #@ 파일 읽기
    public function read() : array{
        $contents = [];
        if(parent::isFile() && parent::isReadable())
        {
            while (!parent::eof()) {
                $contents[] =parent::fgets();
            }
        }
    return $contents;
    }

    #@ 파일쓰기
    public function put(string $context) : int|bool{
        $written=0;
        if(parent::isWritable()){
            if(function_exists('file_put_contents')){
                $written = file_put_contents($this->file_name, $context);
            }
        }
```

```
    return $written;
    }

    #@ 파일 읽기
    public function get() : string|false{
        $contents = '';
        if(parent::isFile() && parent::isReadable())
        {
            if(function_exists('file_get_contents')){
                $contents = file_get_contents($this->file_name);
            }
        }
    return $contents;
    }

    #@ 쓰기 CSV
    /*
     * $list = array (
            array('aaa', 'bbb', 'ccc', 'dddd'),
            array('123', '456', '789')
        );
    */
    public function write_csv(array $args) : void {
        if(is_array($args))
        {
            if(PHP_VERSION_ID>=50400){
                foreach ($args as $fields) {
                    parent::fputcsv($fields);
                }
            }else{
                $fp = fopen($this->file_name, $this->open_mode);
                if(is_resource($fp)){
                    foreach ($args as $datav) {
                        fputcsv($fp, $datav);
                    }
                    fclose($fp);
                }
            }
        }
    }

    #@ 읽기 CSV
    public function read_csv() : array{
        $args = [];
        while (!parent::eof()) {
            $args[] = array_filter(parent::fgetcsv());
        }
    return array_filter($args);
    }
}
```

--- 파일 경로: classes/File/Upload.php ---

```
<?php
namespace Flex\Banana\Classes\File;

use Flex\Banana\Classes\Dir\DirInfo;
use Flex\Banana\Classes\Image\ImageExif;
use Flex\Banana\Classes\Cipher\CipherGeneric;
use Flex\Banana\Classes\Cipher\HashEncoder;
use Flex\Banana\Classes\Log;
use \Exception;

class Upload extends DirInfo
{
    public const __version = '2.2.3';
    public string $file_extension = '';
    public string $mimeType;
    public $process;
    public string $savefilename = '';

    private array $error_msg = [
        UPLOAD_ERR_INI_SIZE    => 'e_upload_max_filesize',
        UPLOAD_ERR_FORM_SIZE   => 'e_upload_max_filesize',
```

```
    UPLOAD_ERR_PARTIAL     => 'e_partially_uploaded',
    UPLOAD_ERR_NO_FILE     => 'e_no_was_uploaded',
    UPLOAD_ERR_NO_TMP_DIR  => 'e_miss_temp_folder',
    UPLOAD_ERR_CANT_WRITE  => 'e_failed_write_disk',
    UPLOAD_ERR_EXTENSION   => 'e_upload_stopped',
];

# 1
public function __construct(string $directory)
{
    parent::__construct($directory);
}

# 2 첨부파일
public function process(string $process_id, array $_files) : Upload
{
    # 값이 정상적인지 체크
    if (!isset($_files[$process_id])) {
        self::exceptionsErrorHandler(UPLOAD_ERR_NO_FILE);
    }

    $this->process = $_files[$process_id];
    $filename = method_exists($this->process, 'getClientFilename') ? $this->process->getClientFilename() : $this->process['name'];
    $mimeType = method_exists($this->process, 'getClientMediaType') ? $this->process->getClientMediaType() : $this->process['type'];
    $size = method_exists($this->process, 'getSize') ? $this->process->getSize() : $this->process['size'];
    $error = method_exists($this->process, 'getError') ? $this->process->getError() : $this->process['error'];

    Log::d('-----------< Upload >-------------------');
    Log::d('filename', $filename);
    Log::d('mimeType', $mimeType);
    Log::d('size', $size);
    Log::d('error', $error);
    Log::d('----------------------------------------');

    # 기초에러
    if ($error !== UPLOAD_ERR_OK) {
        self::exceptionsErrorHandler($error);
    }

return $this;
}

# 3 업로드 허용된 파일 인치 체크
public function filterExtension(array $allowe_extension=['jpg','jpeg','png','gif']) : Upload
{
    $this->getExtName();
    if (!in_array($this->file_extension, $allowe_extension)) {
        self::exceptionsErrorHandler(UPLOAD_ERR_EXTENSION);
    }
return $this;
}

# 4 파일크기 체크 8(M),12(M),100(M)
public function filterSize(int $size) : Upload
{
    $maxsize = (int)(1024 * 1024 * $size);
    $fileSize = $this->process->getSize() ?? $this->process['size'];
    if ($fileSize >= $maxsize) {
        self::exceptionsErrorHandler(UPLOAD_ERR_INI_SIZE);
    }
    return $this;
}


# 5 업로드할 디렉토리 체크 및 만들기
public function makeDirs() : Upload
{
    try {
        parent::makesDir();
    } catch (Exception $e) {
        throw new Exception($e->getMessage());
    }
return $this;
}

# 6 업로드 파일 복사하기
public function save(): Upload
{
    #저장할파일명
```

```
    $tempfilename  = str_replace(['.',' '],['_','_'], microtime());
    $this->savefilename = sprintf("%s.%s", (new CipherGeneric(new HashEncoder($tempfilename)))->hash(), $this->file_extension);
    $fullname = sprintf("%s/%s", $this->directory, $this->savefilename);

    # 파일 저장
    try {
        if ($this->process->getStream() !== null) {
            # BufferedBody 객체에서 내용을 가져옴
            $bodyContent = (string)$this->process->getStream();
            if (file_put_contents($fullname, $bodyContent) === false) {
                throw new Exception('Failed to write file to disk.');
            }
        } else {
            # 업로드된 파일인지 체크
            if (!$this->is_upload_files()) {
                self::exceptionsErrorHandler(UPLOAD_ERR_NO_FILE);
            }

            # 파일 이동 저장
            if (!move_uploaded_file($this->process['tmp_name'], $fullname)) {
                self::exceptionsErrorHandler(UPLOAD_ERR_CANT_WRITE);
            }
        }
    } catch (Exception $e) {
        Log::e(__LINE__, $e->getMessage());
        self::exceptionsErrorHandler(UPLOAD_ERR_CANT_WRITE);
    }

return $this;
}

# 7 orientation
public function filterOrientation() : Upload
{
    # jpeg, jpg 인지 체크
    if (preg_match('/(jpeg|jpg)/', $this->file_extension)) {
        $fullname = sprintf("%s/%s", $this->directory, $this->savefilename);
        $ifdo = (new ImageExif($fullname))->getIfdo();
        if (isset($ifdo['Orientation']) && !empty($ifdo['Orientation'])) {
            $im = imagecreatefromjpeg($fullname);
            switch ($ifdo['Orientation']) {
                case 8:
                    $rotate = imagerotate($im, 90, 0);
                    imagejpeg($rotate, $fullname);
                    break;
                case 3:
                    $rotate = imagerotate($im, 180, 0);
                    imagejpeg($rotate, $fullname);
                    break;
                case 6:
                    $rotate = imagerotate($im, -90, 0);
                    imagejpeg($rotate, $fullname);
                    break;
            }
        }
    }
return $this;
}

# end fetch
public function fetch() : array
{
    return [
        'filesize'  => $this->process->getSize() ?? $this->process['size'],
        'mimeType'  => $this->mimeType,
        'ofilename' => self::cleansEtcWords(),
        'sfilename' => $this->savefilename
    ];
}

# 파일 확장자 추출
private function getExtName() : void
{
    $filename = $this->process->getClientFilename() ?? $this->process['name'];
    $count = strrpos($filename, '.');
    $this->file_extension = strtolower(substr($filename, $count + 1));
    $this->mimeType = (preg_match('/(gif|jpeg|jpg|png)/', $this->file_extension)) ? 'image/' . $this->file_extension : 'application/' . $this->file_extension;
}
# 업로드된 파일인지 체크
```

```
    private function is_upload_files(): bool {
        if (!isset($this->process['tmp_name']) || !is_uploaded_file($this->process['tmp_name'])) {
            return false;
        }
    return true;
    }

    # 첨부 실파일명 특수문자 제거
    private function cleansEtcWords() : string {
        $ofilename = preg_replace("/[ #\&\+\-%@=\/\\\:;,\'\"\^`~\|\!\?\*$#<>()\[\]\{\}]/i", '_', $this->process->getClientFilename() ?? $this->process['name']);
        $ofilename = preg_replace('/\s+/', '_', $ofilename); // 연속된 공백을 하나의 문자로 변경
    return $ofilename;
    }

    # 에러 발생시키기
    private function exceptionsErrorHandler(int $error_no) : void {
        if (array_key_exists($error_no, $this->error_msg)) {
            throw new Exception($this->error_msg[$error_no]);
        }
    }
}
```

--- 파일 경로: classes/Ftp/Ftp.php ---

```
<?php
namespace Flex\Banana\Classes\Ftp;

use Flex\Banana\Classes\Ftp\FtpObject;

final class Ftp extends FtpObject
{
    public const __version = '1.1';
    private $ascii_type = [
        'txt','htm','html','phtml','php','php3','php4',
        'inc','ini','asp','aspx','jsp','css','js'
    ];

    public function __construct(string $host,string $user, string $passwd, int $port,bool $is_ssl=false, int $time=60){
        parent::__construct($host, $port, $is_ssl, $time);
        $this->ftp_login($user, $passwd);
    }

    # 파일 내용 읽어 오기
    public function open_file_read(string $tmpfile, string $remote_file) : string
    {
        if(!$this->ftp_get($tmpfile, $remote_file, $this->chk_open_mode($remote_file)))
            return false;

        $fp=fopen($tmpfile,'r');
        $contents = fread($fp, filesize($tmpfile));
        fclose($fp);

    return $contents;
    }

    public function open_file_write(string $tmpfile, string $remote_file, string $contents) : bool
    {
        if(!$this->isExists($tmpfile)){
            return false;
        }

        if(empty($contents))
            return false;

        $fp = fopen($tmpfile, 'w');
        fwrite($fp, $contents);
        fclose($fp);
        if(!$this->ftp_put($remote_file, $tmpfile, $this->chk_open_mode($remote_file)))
            return false;

        @unlink($tmpfile);
    return true;
    }
    # 파일삭제
```

```
    public function delete_file(string $dir, string $del_filename) : void{
        $files = $this->ftp_nlist($dir);
        if(is_array($files)){
            foreach ($files as $file){
                $realname = basename($file);
                if($del_filename == $realname){
                    $this->ftp_delete($file);
                    break;
                }
            }
        }
    }

    # 로컬 파일인지 체크
    private function isExists(string $filename) : bool{
        if(!file_exists($filename)) return false;
    return true;
    }

    #@ return int
    private function chk_open_mode(string $filename) : int
    {
        $extention = strtolower($this->getExtention($filename));

        if(!in_array($extention, $this->ascii_type)) return FTP_ASCII;
        else return FTP_BINARY;
    }

    # 파일 확장자 추출
    private function getExtention(string $filename) : string{
        $tmpfile = basename($filename);
        $count= strrpos($tmpfile,'.');
        $extention= strtolower(substr($tmpfile, $count+1));
    return $extention;
    }
}
```

--- 파일 경로: classes/Ftp/FtpObject.php ---

```
<?php
namespace Flex\Banana\Classes\Ftp;

class FtpObject
{
    public const __version = '1.1';
    public $conn;

    public function __construct(string $ftp_url, int $port, bool $is_ssl, int $time){
        if($is_ssl){
            if(false === ($this->conn = @ftp_ssl_connect($ftp_url, $port, $time))){
                throw new \Exception("ftp ssl connect fail!!!!");
            }
        } else {
            if (false === ($this->conn = @ftp_connect($ftp_url, $port, $time))) {
                throw new \Exception("ftp connect fail!!!!");
            }
        }
    }

    public function __call(string $func,array $params){
        if(strstr($func,'ftp_') !== false && function_exists($func)){
            array_unshift($params,$this->conn);
            return call_user_func_array($func,$params);
        }
    }

    public function __destruct(){
        ftp_close($this->conn);
    }
}
```

--- 파일 경로: classes/Html/XssChars.php ---

```php
<?php
namespace Flex\Banana\Classes\Html;

# purpose : xss 방지 및
class XssChars
{
    public const __version = '1.9.1';
    private string $description;
    private array $allow_tags = [];

    public function __construct(string $description){
        $this->description = $description;
    }

    #@ void
    # 허용 태그 설정
    public function setAllowTags(string $value) : void{
        if(is_array($value)) $this->allow_tags = array_merge($this->allow_tags,$value);
        else $this->allow_tags[] = $value;
    }

    # strip_tags
    public function cleanTags() : string{
        return strip_tags(htmlspecialchars_decode($this->description),implode('', $this->allow_tags));
    }

    #@ return String
    # Xss 태그 처리
    public function cleanXssTags() : string
    {
        $xss_tags = array(
            '@<script[^>]*?>.*?</script>@si',
            '@<style[^>]*?>.*?</style>@siU',
            '@<iframe[^>]*?>.*?</iframe>@si',
            '@<meta[^>]*?>.*?>@si',
            '@<form[^>]*?>.*?>@si',
            '@]script[^>]*?>.*?]/script>@si',    // [\xC0][\xBC]script>[code][\xC0][\xBC]/script>
            '/:*?expression\(.*?\)/si',
            '/:*?binding:(.*?)url\(.*?\)/si',
            '/javascript:[^\"\']*/si',
            '/vbscript:[^\"\']*/si',
            '/livescript:[^\"\']*/si',
            '@<![\s\S]*?--[ \t\n\r]*>@'// multi-line comments including CDATA
        );

        $event_tags = array(
            'dynsrc','datasrc','frameset','ilayer','layer','applet',
            'onabort','onactivate','onafterprint','onsubmit','onunload',
            'onafterupdate','onbeforeactivate','onbeforecopy','onbeforecut',
            'onbeforedeactivate','onbeforeeditfocus','onbeforepaste','onbeforeprint',
            'onbeforeunload','onbeforeupdate','onblur','onbounce','oncellchange',
            'onchange','onclick','oncontextmenu','oncontrolselect','oncopy','oncut',
            'ondataavaible','ondatasetchanged','ondatasetcomplete','ondblclick',
            'ondeactivate','ondrag','ondragdrop','ondragend','ondragenter',
            'ondragleave','ondragover','ondragstart','ondrop','onerror','onerrorupdate',
            'onfilterupdate','onfinish','onfocus','onfocusin','onfocusout','onhelp',
            'onkeydown','onkeypress','onkeyup','onlayoutcomplete','onload','onlosecapture',
            'onmousedown','onmouseenter','onmouseleave','onmousemove','onmoveout',
            'onmouseover','onmouseup','onmousewheel','onmove','onmoveend','onmovestart',
            'onpaste','onpropertychange','onreadystatechange','onreset','onresize',
            'onresizeend','onresizestart','onrowexit','onrowsdelete','onrowsinserted',
            'onscroll','onselect','onselectionchange','onselectstart','onstart','onstop'
        );

        // 허용 태그 확인
        if(is_array($this->allow_tags)){
            $this->allow_tags = explode(',',strtr(implode(',',$this->allow_tags),['<'=>'','>'=>'']));
            $tmp_eventag= str_replace($this->allow_tags,'',implode('|',$event_tags));
            $event_tags = explode('|',$tmp_eventag);
        }

        return preg_replace($xss_tags, '', str_ireplace($event_tags,'_badtags',$this->description));
    }

    # 자동 링크 걸기
    public function setAutoLink() : string
```

```
{
    $homepage_pattern = "/([^\"\'\=])(mms|market|http|https|HTTP|ftp|FTP|telnet|TELNET)\:\/\/(.[^ \n\<\"\']+)/";
    $this->description = preg_replace($homepage_pattern,"\\1<a href='\\2://\\3' target='_blank'>\\2://\\3</a>"," '.$this->description);

    // 메일 치환
    $email_pattern = "/([ \n]+)([a-z0-9\_\-\.]+)@([a-z0-9\_\-\.]+)/";
    return preg_replace($email_pattern,"\\1<a href='mailto:\\2@\\3>\\2@\\3'</a>", " ".$this->description);
}

# url 링크에 http가 있는지 확인후 붙여서 리턴해 주기
public function setHttpUrl() : string
{
    if($this->description)
        $this->description = trim($this->description);

    if (strpos($this->description, 'http') ===false) {
        $this->description = 'http://'.$this->description;
    }
return $this->description;
}

# code html highlight
public function getXHtmlHighlight() : string
{
    $str = highlight_string($this->description, true);
    $str = preg_replace('#<font color="([^\']*)">([^\']*)</font>#', '<span style="color: \\1">\\2</span>', $str);
    return preg_replace('#<font color="([^\']*)">([^\']*)</font>#U', '<span style="color: \\1">\\2</span>', $str);
}

# 여러형태의 모양
public function getContext(string $mode='XSS') : string
{
    $this->description =stripslashes($this->description);
    switch(strtoupper($mode)){
        case 'TEXT':
            $this->description = strtr($this->description, [" "=>' ']);
            $this->description = strtr($this->description,["\r\n"=>"\n"]);
            $this->description = $this->setAutoLink();
            $this->allow_tags  = ['<a>'];
            $this->description = $this->cleanTags();
            break;
        case 'XSS':
            $this->description = strtr($this->description,["\r\n"=>"\n"]);
            $this->description = strtr($this->description,["\n"=>"<br>"]);
            $this->description = strtr($this->description,["<br/>"=>"<br>"]);
            $this->description = $this->setAutoLink();
            $this->description = $this->cleanXssTags();
            break;
        case 'HTML':
            $this->description = strtr($this->description,["\r\n"=>"\n"]);
            $this->description = strtr($this->description,["\n"=>"<br>"]);
            $this->description = $this->setAutoLink();
            $this->description = htmlspecialchars($this->description);
            break;
        case 'XHTML' :
            $this->description = $this->getXHtmlHighlight();
            $this->description = $this->setAutoLink();
            break;
    }
return $this->description;
}

public function __call(string $query, array $args=[]) : mixed
{
    $_query = strtolower($query);

    # 배열을 dictionary Object
    if($_query == 'gettext'){
        return $this->getContext('TEXT');
    }else if($_query == 'getxss'){
        return $this->getContext('XSS');
    }else if($_query == 'gethtml'){
        return $this->getContext('HTML');
    }else if($_query == 'getxhtml'){
        return $this->getContext('XHTML');
    }else {
        return null;
    }
}
```

```
}
```

--- 파일 경로: classes/Http/HttpRequest.php ---

```
<?php
namespace Flex\Banana\Classes\Http;
use Flex\Banana\Classes\Log;

class HttpRequest {
    public const __version = '1.3.0';
    private $urls = [];
    private $mch;

    public function __construct(array $argv = []) {
        if (!is_array($argv)) {
            throw new \Exception(__CLASS__.' :: '.__LINE__.' is not array');
        }
        $this->urls = $argv;
        $this->mch = curl_multi_init();
    }

    public function set(string $url, string $params, array $headers = []): HttpRequest {
        if (trim($url)) {
            $this->urls[] = [
                "url"     => $url,
                "params"  => $params,
                "headers" => $headers
            ];
        }
        return $this;
    }

    public function get(callable $callback = null) {
        $response = $this->execute('GET');
        if ($callback !== null && is_callable($callback)) {
            $callback($response);
        }
        return $response;
    }

    public function post(callable $callback = null) {
        $response = $this->execute('POST');
        if ($callback !== null && is_callable($callback)) {
            $callback($response);
        }
        return $response;
    }

    public function put(callable $callback = null) {
        $response = $this->execute('PUT');
        if ($callback !== null && is_callable($callback)) {
            $callback($response);
        }
        return $response;
    }

    public function delete(callable $callback = null) {
        $response = $this->execute('DELETE');
        if ($callback !== null && is_callable($callback)) {
            $callback($response);
        }
        return $response;
    }

    public function patch(callable $callback = null) {
        $response = $this->execute('PATCH');
        if ($callback !== null && is_callable($callback)) {
            $callback($response);
        }
        return $response;
    }

    private function execute(string $method)
    {
```

```
$response = [];
foreach ($this->urls as $idx => $url)
{
    $ch[$idx] = curl_init($url['url']);

    $headers = $url['headers'] ?? [];
    $params = $url['params'];

    curl_setopt($ch[$idx], CURLOPT_CUSTOMREQUEST, $method);
    curl_setopt($ch[$idx], CURLOPT_SSL_VERIFYHOST, false);
    curl_setopt($ch[$idx], CURLOPT_SSL_VERIFYPEER, false);
    curl_setopt($ch[$idx], CURLOPT_RETURNTRANSFER, true);

    $contentType = $this->getContentType($headers);

    if ($method !== 'GET') {
        $postFields = $this->preparePostFields($params, $contentType);
        curl_setopt($ch[$idx], CURLOPT_POSTFIELDS, $postFields);
    } else if ($params) {
        $url['url'] .= (strpos($url['url'], '?') === false ? '?' : '&') . $params;
        curl_setopt($ch[$idx], CURLOPT_URL, $url['url']);
    }

    if (!$this->hasContentTypeHeader($headers) && $contentType) {
        $headers[] = "Content-Type: $contentType";
    }

    curl_setopt($ch[$idx], CURLOPT_HTTPHEADER, $headers);
    curl_multi_add_handle($this->mch, $ch[$idx]);
}

do {
    curl_multi_exec($this->mch, $running);
    curl_multi_select($this->mch);
} while ($running > 0);

foreach (array_keys($ch) as $index) {
    $httpCode = curl_getinfo($ch[$index], CURLINFO_HTTP_CODE);
    $body = curl_multi_getcontent($ch[$index]);

    $contentTypeHeader = curl_getinfo($ch[$index], CURLINFO_CONTENT_TYPE);
    $isJsonResponse = stripos($contentTypeHeader, 'application/json') !== false;

    // 이미 배열인지 확인
    if (is_array($body)) {
        $decodedBody = $body;
    } else if (is_string($body) && !empty($body)) {
        if ($isJsonResponse) {
            // JSON 디코딩 시도
            $decodedBody = $body; // 기본값으로 원본 설정
            if (version_compare(PHP_VERSION, '7.3.0', '>=')) {
                try {
                    $tempDecoded = json_decode($body, true, 512, JSON_THROW_ON_ERROR);
                    if (is_array($tempDecoded)) {
                        $decodedBody = $tempDecoded;
                    }
                } catch (\JsonException $e) {
                    Log::e($index, 'JSON decode error', $e->getMessage());
                    throw new \Exception(json_encode(['message' => $e->getMessage(),'body' => $body]));
                }
            } else {
                $tempDecoded = json_decode($body, true);
                if (json_last_error() === JSON_ERROR_NONE && is_array($tempDecoded)) {
                    $decodedBody = $tempDecoded;
                } else {
                    Log::e($index, 'JSON decode error', json_last_error_msg());
                    throw new \Exception(json_encode(['message' => $e->getMessage(),'body' => json_last_error_msg()]));
                }
            }
        } else {
            $decodedBody = $body;
        }
    } else {
        $decodedBody = $body;
    }

    $response[$index] = [
        'code' => $httpCode,
        'body' => $decodedBody,
```

```
                'url' => curl_getinfo($ch[$index], CURLINFO_EFFECTIVE_URL)
            ];
            curl_multi_remove_handle($this->mch, $ch[$index]);
        }

        $this->urls = [];
        return $response;
    }

    private function getContentType($headers): ?string {
        foreach ($headers as $header) {
            if (stripos($header, 'Content-Type:') === 0) {
                list(, $contentType) = explode(':', $header, 2);
                return trim($contentType);
            }
        }
        return null;
    }

    private function hasContentTypeHeader($headers): bool {
        foreach ($headers as $header) {
            if (stripos($header, 'Content-Type:') === 0) {
                return true;
            }
        }
        return false;
    }

    private function preparePostFields($params, $contentType) {
        switch ($contentType) {
            case 'application/json':
                return $params; // JSON string as is
            case 'application/x-www-form-urlencoded':
                return $params; // URL encoded string as is
            case 'multipart/form-data':
                parse_str($params, $parsedParams);
                $postFields = [];
                foreach ($parsedParams as $key => $value) {
                    if (is_string($value) && strpos($value, '@') === 0 && file_exists(substr($value, 1))) {
                        $filePath = substr($value, 1);
                        $finfo = finfo_open(FILEINFO_MIME_TYPE);
                        $mimeType = finfo_file($finfo, $filePath);
                        finfo_close($finfo);
                        $fileName = basename($filePath);
                        $postFields[$key] = new \CURLFile($filePath, $mimeType, $fileName);
                    } else {
                        $postFields[$key] = $value;
                    }
                }
                return $postFields;
            default:
                return $params;
        }
    }

    public function __destruct() {
        curl_multi_close($this->mch);
    }
}
```

--- 파일 경로: classes/Http/HttpResponse.php ---

```
<?php
namespace Flex\Banana\Classes\Http;

final class HttpResponse {
    public const __version = '0.5';

    public function __construct(
        private int $code,
        private array $headers,
        private mixed $message
    ){}
    public function __invoke(): mixed
```

```
    {
        // HEADERS
        foreach ($this->headers as $header_key => $header_value) {
            header(sprintf("%s:%s",$header_key,$header_value));
        }

        // HTTP 상태 코드 설정
        http_response_code($this->code);

        return $this->message;
    }

    public function __toString(): string
    {
        return (string)$this();
    }
}
```

--- 파일 경로: classes/Http/HttpUrlFilter.php ---

```
<?php
namespace Flex\Banana\Classes\Http;

class HttpUrlFilter
{
    public const __version = '0.5';
    public function __construct(
        private string $url
    )
    {}

    # http|https 가 있는지 확인 후 glue 붙이기
    public function httpPrefix(string $glue='http') : HttpUrlFilter
    {
        if (!preg_match("~^(?:f|ht)tps?://~i", $this->url)) {
            $this->url = $glue . '://' .$this->url;
        }
        return $this;
    }

    public function wwwPrefix() : HttpUrlFilter
    {
        // http(s)://가 있지만 www가 없는 경우
        if (preg_match("/^https?:\/\/(?!www\.)/i", $this->url)) {
            $this->url = preg_replace("/^https?:\/\//i", "$0www.", $this->url);
        }
        // htts(s)가 없이 ://만 있고 www가 없는 경우
        else if (preg_match("/^:\/\/(?!www\.)/i", $this->url)) {
                $this->url = preg_replace("/^:\/\//i", "$0www.", $this->url);
        }
        else if (!preg_match("/^www\./i", $this->url)) {
            $this->url = "www." . $this->url;
        }

        return $this;
    }

    # 가져오기
    public function __get(string $propertyName) : mixed{
        return $this->url;
    }
}
```

--- 파일 경로: classes/Image/ImageExif.php ---

```
<?php
namespace Flex\Banana\Classes\Image;

# purpose : 카메라 촬영 정보
class ImageExif
```

```
{
    public const __version = '0.9';
    private $exifargs = [];

    # computed : 넓이,높이,조리개,촬영거리,CCD
    # ifdo : 카메라정보
    # exif : 노출모드,조리개값,플래시사용여부,화이트발란스,줌,ISO감도,초점거리,측광모드 ,오리지날촬영시간
    # makenote : 펌웨어버전,사용렌즈
    private $setkey_args = [
        'file'        => ['FileName','FileSize','FileDateTime','MimeType'],
        'computed'    => ['Width','Height','ApertureFNumber','FocusDistance','CCDWidth'],
        'ifdo'        => ['Make','Model','Software','Orientation'],
        'exif'        => ['ExposureTime','FNumber','Flash','WhiteBalance','DigitalZoomRatio','ISOSpeedRatings','FocalLength','MeteringMode','DateTimeOriginal'],
        'makenote'    => ['FirmwareVersion','UndefinedTag:0x0095']
    ];

    # 사진 전체 경로
    public function __construct(string $picture){
        # 로컬 파인인지 체크
        if(!file_exists($picture))
            throw new \Exception(__CLASS__.' :: '.__LINE__.' '.strval($picture).' not found');

        # 함수 enable 체크
        if(function_exists('exif_read_data')){
            $this->exifargs = @exif_read_data($picture,0,true);
            if($this->exifargs ===false)
                throw new \Exception(__CLASS__.' :: '.__LINE__.' exif_read_data functions are not available');
        }
    }

    # FILE
    public function getFile() : array
    {
        $result = [];
        if(isset($this->exifargs['FILE'])){
            $result = $this->exifargs['FILE'];
        }
    return $result;
    }

    # COMPUTED
    public function getComputed() : array
    {
        $result = [];
        if(isset($this->exifargs['COMPUTED'])){
            $args =& $this->exifargs['COMPUTED'];
            foreach($args as $k => $v){
                switch($k){
                    case 'FocusDistance':
                        $result[$k] = $v;
                        if(strpos($v,'/') !==false){
                            $tmpdistance = explode('/',$v);
                            $result[$k] = ($tmpdistance[0]/$tmpdistance[1]).'mm';
                        }
                        break;
                    case 'CCDWidth':
                        $result[$k] = (!empty($v)) ? substr($v,0,5).' mm' : '';
                        break;
                    default :
                        $result[$k] = $v;
                }
            }
        }
    return $result;
    }

    # IFDO
    public function getIfdo() : array
    {
        $result = [];
        if(isset($this->exifargs['IFD0'])){
            $args =& $this->exifargs['IFD0'];
            foreach($args as $k => $v){
                switch($k){
                    case 'Make':
                        $result[$k] = str_replace('CORPORATION','',$v);
                        break;
                    default:
                        $result[$k] = $v;
```

```
                }
            }
        }
    return $result;
    }

    # EXIF
    public function getExif() : array
    {
        $result = [];
        if(isset($this->exifargs['EXIF'])){
            $args =& $this->exifargs['EXIF'];
            foreach($args as $k => $v){
                switch($k){
                    case 'Flash': $result[$k] = ($v==1) ? 'ON' : 'OFF'; break;
                    case 'ExposureTime':
                        $result[$k] = $v;
                        if(strpos($v,'/') !==false){
                            $tmpexpo = explode('/',$v);
                            $result[$k] = ($tmpexpo[0]/$tmpexpo[0]).'/'.($tmpexpo[1]/$tmpexpo[0]).'s';
                        }
                        break;
                    case 'FocalLength':
                        $result[$k] = $v;
                        if(strpos($v,'/') !==false){
                            $tmpfocal    = explode('/',$v);
                            $result[$k] = ($tmpfocal[0]/$tmpfocal[1]).'mm';
                        }
                        break;
                    case 'MakerNote':
                        break;
                    default: $result[$k] = $v;
                }
            }
        }
    return $result;
    }

    # GPS
    public function getGPS() : array
    {
        $result = [];
        if(isset($this->exifargs['GPS'])){
            $result = $this->exifargs['GPS'];
        }
    return $result;
    }

    # MAKENOTE
    public function getMakenote() : array
    {
        $result = [];
        if(isset($this->exifargs['MAKENOTE'])){
            $args =& $this->exifargs['MAKENOTE'];
            foreach($this->setkey_args['makenote'] as $k => $v){
                $result[$k] = $v;
            }
        }
    return $result;
    }

    # 한번에 추출하기
    public function fetch() : array
    {
        $args = [];
        if(count($this->exifargs)>0){
            foreach($this->setkey_args as $k => $v){
                $methodName = 'get'.ucwords($k);
                $args += call_user_func_array(array(&$this, $methodName), array());
            }
        }
    return $args;
    }
}
```

--- 파일 경로: classes/Image/ImageGDS.php ---

```php
<?php
namespace Flex\Banana\Classes\Image;

# purpose : 이미지 효과주기
class ImageGDS
{
    public const __version = '1.3';
    public $filename;

    public $im;
    private $quality = 100;
    private $bgcolor = 0x7fffffff;
    private $fontsrc, $fontangle=0, $color = [0,0,0], $fontsize = 20, $x=5, $y=5;

    # 시작
    public function __construct(string|null $filename=null){
        if($filename && !file_exists($filename)) {
            throw new \Exception(__METHOD__.' '.$filename,__LINE__);
        }

        if(!is_null($filename)){
            $this->filename = $filename;
        }
    }

    # void 퀄리티 설정
    public function setCompressionQuality(int $quality) : void
    {
        $this->quality = $quality;
    }

    # 칼라 채우기
    public function setFilledrectangle(mixed $image,int $x1, int $y1, int $x2, int $y2, string $color) : mixed
    {
        if(false === ($im = imagefilledrectangle($image,$x1,$y1,$x2,$y2,$color))) return false;
    return $im;
    }

    # 칼라 채우기 RGB
    public function setColorallocate(mixed $image, int $r, int $g, int $b) : mixed
    {
        if(0 > ($im = imagecolorallocate($image,$r,$g,$b))) return false;
    return $im;
    }

    # alpha
    public function setAlphablending(mixed $image,bool $boolean=false) : void
    {
        imagealphablending($image, $boolean);
    }

    # alpha
    public function setSavealpha(mixed $image,bool $boolean=false) : void
    {
        imagesavealpha($image, $boolean);
    }

    public function setFttext(mixed $image, int $fontcolor, string $text){
        imagefttext($image,$this->fontsize,$this->fontangle,$this->x,$this->y,$fontcolor,$this->fontsrc,$text);
    }

    # 폰트 파일 경로 지정
    public function setFont(string $fontsrc) : void { $this->fontsrc = $fontsrc; }

    # 칼라 지정
    public function setFontColor(array $color) : void { $this->color = $color; }

    # 폰트 사이즈
    public function setFontSize(string $pixel): void { $this->fontsize = $pixel; }

    # 배경칼라
    public function setBgColor(string $bgcolor) : void { $this->bgcolor = $bgcolor; }

    # 폰트 앵글
    public function setFontAngle(int $angle) : void { $this->fontangle = $angle; }
    # x:y 축
```

```
public function setXY(int $x, int $y) : void { $this->x = $x; $this->y = $y; }

# 텍스트 이미지 만들기
public function writeTextImage(int $width, int $height, string $text) : void{
    $this->im = $this->createTrueImage($width,$height);
    $this->setAlphablending($this->im);
    $this->setFilledrectangle($this->im,0,0,$width,$height,$this->bgcolor);

    $fontcolor = $this->setColorallocate($this->im,$this->color[0],$this->color[1],$this->color[2]);
    $this->setFttext($this->im,$fontcolor,$text);
    $this->setSavealpha($this->im,true);
}

public function setAntialias(mixed $image,bool $boolean=false): void {
    imageantialias($image,$boolean);
}

public function setTTFText(mixed $image,float $size,int $x, int $y,int $color,string $text){
    imagettftext($image,$size,$this->fontangle,$x,$y,$color,$this->fontsrc,$text);
}

# 그림자 입체 텍스트 쓰기
public function writeShadowText(int $width, int $height,string $text,array $bgRGB=[255,255,255], array $mdRGB=[128,128,128], array $frontRGB=[0,0,0]) :voi
{
    $this->im = $this->createTrueImage($width,$height);

    $bg     = $this->setColorallocate($this->im,$bgRGB[0],$bgRGB[1],$bgRGB[2]);
    $middle = $this->setColorallocate($this->im, $mdRGB[0],$mdRGB[1],$mdRGB[2]);
    $front  = $this->setColorallocate($this->im, $frontRGB[0],$frontRGB[1],$frontRGB[2]);
    $this->setFilledrectangle($this->im,0,0,$width-1,$height-1,$bg);

    // Add some shadow to the text
    $this->setTTFText($this->im,$this->fontsize,$this->x,$this->y,$middle,$text);

    // Add the text
    $this->setTTFText($this->im,$this->fontsize, ($this->x - 1), ($this->y - 1),$front,$text);
}

# 이미지 위에 텍스트 쓰기
public function combineImageText(int $width, int $height, string $text, string|null $filename=null) : void{
    $this->im = $this->createTrueImage($width,$height);
    $this->setAntialias($this->im,true);
    $fontcolor = $this->setColorallocate($this->im,$this->color[0],$this->color[1],$this->color[2]);

    $filename = ($filename) ? $filename : $this->filename;
    if(!$filename) throw new \Exception(__CLASS__.':'.__METHOD__.':'.__LINE__);

    $image = $this->readImage($filename);
    $this->copy($this->im,$image,0,0,0,0,$width,$height);
    $this->setTTFText($this->im,$this->fontsize,$this->x,$this->y,$fontcolor,$text);
}

# margin_x : 가로 여백, margin_y : 세로 여백
# RB : 오른쪽 아래 기분, LB : 왼쪽 아래 기분, LT : 왼쪽 위 기준, RT : 오른쪽 위 기준
public function filterWatermarks(string $marksfilename,int $margin_x=10,int $margin_y=10, string $position='RB'): void
{
    if(!file_exists($marksfilename))
        throw new \Exception(__CLASS__.':'.__METHOD__.':'.$marksfilename);

    $this->im = $this->readImage($this->filename);
    $this->setAntialias($this->im,true);
    $image = $this->readImage($marksfilename);

    $width  = imagesx($image);
    $height = imagesy($image);

    # switch
    $im_x   = $margin_x;
    $im_y   = $margin_y;
    switch ($position){
        case 'RB' :
            $im_x   = imagesx($this->im) - $width - $margin_x;
            $im_y   = imagesy($this->im) - $height - $margin_y;
            break;
        case 'LB' :
            $im_x   = $margin_x;
            $im_y   = imagesy($this->im) - $height - $margin_y;
            break;
        case 'LT' :
```

```
            $im_x   = $margin_x;
            $im_y   = $margin_y;
            break;
        case 'RT' :
            $im_x   = imagesx($this->im) - $width - $margin_x;
            $im_y   = $margin_y;
            break;
    }

    $this->copy($this->im,$image,$im_x,$im_y,0,0,$width,$height);
}

# void 이미지 자르기 int width,height,x,y
public function cropImage(int $width,int $height, int $x, int $y) : void{
    $this->im = $this->createTrueImage($width,$height);
    $image = $this->readImage($this->filename);
    if($this->copy($this->im,$image,0,0,$x,$y,$width,$height) === false)
        throw new \Exception(__METHOD__,__LINE__);
}

# void 이미지 자르기 (center) int width,height
public function cropThumbnailImage(int $width, int $height) : void
{
    $imgsize = $this->getImageSize($this->filename);

    # 조정
    $im_x    = 0;
    $im_y    = 0;
    $image_x = 0;
    $image_y = 0;

    $wm       = $imgsize->width/$width;
    $hm       = $imgsize->height/$height;
    $h_height = $height/2;
    $w_height = $width/2;

    if($imgsize->width > $imgsize->height){
        $width      = $imgsize->width / $hm;
        $half_width = $width / 2;
        $im_x       = -($half_width - $w_height);
    }else if(($imgsize->width < $imgsize->height) || ($imgsize->width == $imgsize->height)){
        $height      = $imgsize->height / $wm;
        $half_height = $height / 2;
        $im_y        = $half_height - $h_height;
    }

    $this->im = $this->createTrueImage($width,$height);
    $image = $this->readImage($this->filename);
    if($this->copyResampled($this->im,$image,$im_x,$im_y,$image_x,$image_y,$width,$height,$imgsize->width,$imgsize->height) === false)
        throw new \Exception(__METHOD__,__LINE__);
}

# 썸네일 이미지 만들기 int width, height
public function thumbnailImage(int $width, int $height) : void
{
    $imgsize = $this->getImageSize($this->filename);

    # 썸네일 사진 사이즈 설정
    if($imgsize->width>$imgsize->height){
        $height= ceil(($imgsize->height*$width)/$imgsize->width);
    }
    else if($imgsize->width<$imgsize->height || $imgsize->width == $imgsize->height){
        $width= ceil(($imgsize->width*$height)/$imgsize->height);
    }

    $this->im = $this->createTrueImage($width,$height);
    $image = $this->readImage($this->filename);
    if($this->copyResampled($this->im, $image, 0,0,0,0,$width,$height,$imgsize->width,$imgsize->height) ===false)
        throw new \Exception(__METHOD__,__LINE__);
}

# imagecopy
public function copy(mixed $im, mixed $image,int $im_x, int $im_y, int $image_x, int $image_y, int $width, int $height) : bool
{
    if(imagecopy($im,$image,$im_x,$im_y,$image_x,$image_y,$width,$height) === false) return false;
return true;
}

# imagemerge
```

```
public function copyMerge(mixed $im, mixed $image, int $im_x, int $im_y, int $image_x, int $image_y,int $width, int $height,$pct) : bool
{
    if(!imagecopymerge($im,$image,$im_x,$im_y,$image_x,$image_y,$width,$height,$pct)) return false;
return true;
}

# imagecopyresampled
public function copyResampled(mixed $im, mixed $image,$im_x,$im_y,$image_x,$image_y,$width,$height,$oriwidth,$oriheight):bool
{
    if(imagecopyresampled($im, $image,$im_x,$im_y,$image_x,$image_y,$width,$height,$oriwidth,$oriheight) ===false) return false;
return true;
}

# void : createtruecolor
public function createTrueImage(int $width, int $height){
    return $im = imagecreatetruecolor($width,$height);
}

# void
public function readImage(string $filename){
    $count    = strrpos($filename,'.');
    $extention = strtolower(substr($filename, $count+1));
    try{
        switch($extention){
            case 'gif': $image = imagecreatefromgif($filename); break;
            case 'png': $image = @imagecreatefrompng($filename); break;
            case 'jpeg':
            case 'jpg':    $image = imagecreatefromjpeg($filename); break;
        }
    }catch(\Exception $e){
        throw new \Exception($e->getMessage());
    }
return $image;
}

# string filename
public function write(string $filename) : void
{
    $count    = strrpos($filename,'.');
    $extention = strtolower(substr($filename, $count+1));
    try{
        switch($extention){
            case 'gif': imagegif($this->im,$filename); break;
            case 'png': imagepng($this->im,$filename,($this->quality/10)-1); break;
            case 'jpg':
            case 'jpeg': imagejpeg($this->im,$filename,$this->quality); break;
        }
    }catch(\Exception $e){
        throw new \Exception($e->getMessage());
    }
}

# @ void : GD 버전
public function getVersion() : float{
    if(function_exists('gd_info')){
        $info = gd_info();
        return floatval(preg_replace('/bundled \((.*) compatible\)/','\\1', $info['GD Version']));
    }
return 0.0;
}

# image data base64 이미지 소스 읽기
public function readImageFromBase64(string $base64)
{
    $data = explode(',', $base64);
    $data = base64_decode($data[1]);
    $image = imagecreatefromstring($data);
    if (!$image) {
        throw new \Exception("Invalid base64 image data");
    }
    return $image;
}

# image data base64 이미지 쓰기
public function writeImageToBase64(): string
{
    ob_start();
    imagepng($this->im);
    $image_data = ob_get_contents();
```

```
        ob_end_clean();
        return '' . base64_encode($image_data);
    }

    # image data base64 이미지 크기 변경하기
    public function resizeBase64Image(string $base64, int $width, int $height): string
    {
        $this->im = $this->readImageFromBase64($base64);
        $imgsize = imagesx($this->im);
        $imgheight = imagesy($this->im);

        if ($imgsize > $imgheight) {
            $height = ceil(($imgheight * $width) / $imgsize);
        } else if ($imgsize < $imgheight || $imgsize == $imgheight) {
            $width = ceil(($imgsize * $height) / $imgheight);
        }

        $resized = $this->createTrueImage($width, $height);
        if ($this->copyResampled($resized, $this->im, 0, 0, 0, 0, $width, $height, $imgsize, $imgheight) === false)
            throw new \Exception(__METHOD__, __LINE__);

        $this->im = $resized;
        return $this->writeImageToBase64();
    }

    # 이미지 사이즈
    public function getImageSize(string $filename) : \stdClass {
        $size = getimagesize($filename);
        if ($size === false) {
            throw new \Exception("Cannot get image size of $filename");
        }
        $imageSize = new \stdClass();
        $imageSize->width = $size[0];
        $imageSize->height = $size[1];
        $imageSize->mime = $size['mime'];
        return $imageSize;
    }

    # @ void
    public function destroy() : void {
        if ($this->im) {
            imagedestroy($this->im);
        }
    }

    public function __destruct(){
        $this->destroy();
    }
}
```

--- 파일 경로: classes/Image/ImageViewer.php ---

```
<?php
namespace Flex\Banana\Classes\Image;

use Flex\Banana\Classes\Image\ImageGDS;
use Exception;

# 이미지 뷰어
final class ImageViewer extends ImageGDS
{
    public const __version = '2.0.1';

    # 이미지 경로
    public string $file_extension = '';
    public string $mimeType;
    public string $basename;
    public string $directory;
    public int $compression;
    public array $viewsize = [];

    final public function __construct(string $filenamez){
        $this->filename = $filenamez;
        $this->getExtName();
```

```
    }

    # 파일 확장자 추출
    private function getExtName() : void{
        $this->basename       = basename($this->filename);
        $count                = strrpos($this->basename,'.');
        $this->file_extension = strtolower(substr($this->basename, $count+1));
        $this->directory      = str_replace('/'.$this->basename,'',$this->filename);
    }

    public function setFilter(int $compression, string $size, array $allowe_extension=['jpg','jpeg','png','gif']) : ImageViewer
    {
        # mimeType
        $file_type = 'application';
        if(in_array($this->file_extension,$allowe_extension)){
            $file_type = 'image';
        }else throw new Exception('e_extension_not_allowed');

        $this->mimeType    = $file_type.'/'.$this->file_extension;
        $this->compression = $compression;
        $this->viewsize    = (strpos($size,'x') !==false) ? explode('x', $size) : [];

    return $this;
    }

    /**
     * @ filename : 파일명
     * @ compression : 압축률
     * @ size : 이미지 사이즈
     * @ file_extension : ['jpg','jpeg','png'] 허용파일 확장자
     */
    public function getContents () : string
    {
        $imagecontents = '';
        if(strpos($this->mimeType,'image/') !== false)
        {
            $fullname = '';
            $thumb_filename = 'thumb'.$this->compression.implode('x',$this->viewsize).'_'.$this->basename;
            if(file_exists($this->directory.'/'.$thumb_filename)){
                $fullname = $this->directory.'/'.$thumb_filename;
            }else{
                try{
                    // $image_size = @getimagesize($fullname);
                    parent::__construct( $this->filename );
                    parent::setCompressionQuality($this->compression);

                    # resize
                    if(isset($this->viewsize[0])){
                        parent::thumbnailImage($this->viewsize[0], $this->viewsize[1]);
                        parent::write($this->directory.'/'.$thumb_filename);
                        $fullname = $this->directory.'/'.$thumb_filename;
                    }

                    # 압축
                    parent::write($this->directory.'/'.$thumb_filename);
                    $fullname = $this->directory.'/'.$thumb_filename;
                }catch(Exception $e){
                    throw new Exception($e->getMessage());
                }
            }

            # base64 image data
            $imagecontents = file_get_contents($fullname);
        }

        return $imagecontents;
    }

    public function fetch() : array {
        $result = [
            'filename'  => $this->basename,
            'mimeType'  => $this->mimeType,
            'extension' => $this->file_extension,
            'contents'  => $this->getContents()
        ];

    return $result;
    }
}
```

--- 파일 경로: classes/Json/JsonDecoder.php ---

```php
<?php
namespace Flex\Banana\Classes\Json;

final class JsonDecoder
{
    public const __version = '0.1.0';

    # 문자열 또는 중첩 문자열을 json 배열로 변환
    final public static function toArray( string $value, bool $assoc = true, int $depth = 512, bool $throwExceptionOnError = false) : array
    {
        do {
            $decoded = json_decode($value, $assoc, $depth);
            if (json_last_error() !== JSON_ERROR_NONE) {
                if ($throwExceptionOnError) {
                    throw new \InvalidArgumentException('Invalid JSON: ' . json_last_error_msg());
                }
                return $value;
            }
            $value = $decoded;
        } while (is_string($value));

        return $value;
    }
}
```

--- 파일 경로: classes/Json/JsonEncoder.php ---

```php
<?php
namespace Flex\Banana\Classes\Json;

final class JsonEncoder
{
    public const __version = '0.1.1';

    # 배열을 json string utf8
    final public static function toJson(array $data, array $except_numberic_keys = [], int $options=JSON_UNESCAPED_UNICODE) : string
    {
        $data = JsonEncoder::applyNumericExceptions($data, $except_numberic_keys);
        return json_encode($data, $options);

    }

    # 특정키를 제외한 numberic으로 변형하기
    private static function applyNumericExceptions(array $data, array $exceptNumericKeys) : array
    {
        foreach ($data as $key => &$value) {
            if (is_array($value)) {
                $value = JsonEncoder::applyNumericExceptions($value, $exceptNumericKeys);
            } elseif (is_numeric($value) && in_array($key, $exceptNumericKeys)) {
                $value = (string) $value;
            } elseif (is_numeric($value)) {
                $value = $value + 0; // 숫자 형 변환
            }
        }
        return $data;
    }

}
```

--- 파일 경로: classes/Log.php ---

```php
<?php
```

```
namespace Flex\Banana\Classes;

final class Log
{
    public const __version = '1.2.2';
    const MESSAGE_FILE   = 3; # 사용자 지정 파일에 저장
    const MESSAGE_ECHO   = 2; # 화면에만 출력
    const MESSAGE_SYSTEM = 0; # syslog 시스템 로그파일에 저장

    public static $message_type = 3;
    public static $logfile = 'log.txt';

    public static $debugs = ['d','v','i','w','e'];
    public static $options = [
        'datetime'   => true,   # 날짜 시간 출력
        'debug_type' => true,   # 디버그 타임 출력
        'newline'    => true    # 한줄내리기 출력
    ];

    # init
    public static function init(int $message_type = -1, string $logfile = null){
        Log::$message_type = ($message_type > -1) ? $message_type : Log::MESSAGE_ECHO;
        Log::$logfile = $logfile ?? 'log.txt';
    }

    # 출력 옵션 설정
    public static function options (array $options=[], bool $datetime=true, bool $debug_type=true, bool $newline=true) : void
    {
        $_options = [];
        if(is_array($options) && count($options)){
            $_options = $options;
        }else{
            $_options = [
                'datetime' => $datetime,  'debug_type' => $debug_type, 'newline' => $newline
            ];
        }

        Log::$options = array_merge(Log::$options, $_options);
    }

    # 출력하고자 하는 옵션 선택
    public static function setDebugs(string|array $m1, ...$mores): void
    {
        $debug_modes = [];
        $debug_modes[] = $m1;
        if(is_array($mores)){
            foreach($mores as $debug_type){
                $debug_modes[] = $debug_type;
            }
        }

        Log::$debugs = $debug_modes;
    }

    # debug
    public static function d (mixed $message, ... $message2) : void
    {
        if(in_array('d', Log::$debugs)){
            $output = Log::filterMessage($message).' | '.implode(' | ',array_map([Log::class, 'filterMessage'],$message2));
            Log::print_('D', $output);
        }
    }

    # success
    public static function v (mixed $message, ... $message2) : void
    {
        if(in_array('v', Log::$debugs)){
            $output = Log::filterMessage($message).' | '.implode(' | ',array_map([Log::class, 'filterMessage'],$message2));
            Log::print_('V', $output);
        }
    }

    # info
    public static function i (mixed $message, ... $message2) : void
    {
        if(in_array('i', Log::$debugs)){
            $output = Log::filterMessage($message).' | '.implode(' | ',array_map([Log::class, 'filterMessage'],$message2));
            Log::print_('I', $output);
        }
```

```
    }

    # warning
    public static function w (mixed $message, ... $message2) : void
    {
        if(in_array('w', Log::$debugs)){
            $output = Log::filterMessage($message).' | '.implode(' | ',array_map([Log::class, 'filterMessage'],$message2));
            Log::print_('W', $output);
        }
    }

    # error
    public static function e (mixed $message, ... $message2) : void
    {
        if(in_array('e', Log::$debugs)){
            $output = Log::filterMessage($message).' | '.implode(' | ',array_map([Log::class, 'filterMessage'],$message2));
            Log::print_('E', $output);
        }
    }

    private static function filterMessage ( mixed $message) : mixed
    {
        $result = $message;
        $typeof = gettype($message);
        if($typeof == 'array' || $typeof == 'object'){
            $result = print_r($message,true);
        }
    return $result;
    }

    # print
    private static function print_ (string $debug_type, string $message) : void
    {
        $logfile = (Log::$message_type == Log::MESSAGE_FILE ) ? Log::$logfile : null;
        $out_datetime   = (Log::$options['datetime']) ? date('Y-m-d H:i:s').' ' : '';
        $out_debug_type = (Log::$options['debug_type']) ? '>> '.$debug_type.' : ' : '';
        $out_newline    = (Log::$options['newline']) ? PHP_EOL : '';

        if(Log::$message_type == Log::MESSAGE_ECHO){
            echo sprintf("%s%s%s%s", $out_datetime, $out_debug_type, addslashes($message), $out_newline);
        }else{
            error_log (
                sprintf("%s%s%s%s", $out_datetime, $out_debug_type, addslashes($message), $out_newline),
                    Log::$message_type,
                        $logfile
            );
        }
    }
}
```

--- 파일 경로: classes/Mail/MailSend.php ---

```
<?php
namespace Flex\Banana\Classes\Mail;

class MailSend
{
    public const __version = '0.1';
    private $to           = ['email'=>'', 'name'=>''];
    private $from         = ['email'=>'', 'name'=>''];
    private $headers_args = [];
    private $message      = '';

    private $headers = '';
    private $charset      = 'utf-8';
    private $encoding     = '8bit';
    private $boundary;

    public function __construct(){
        $this->boundary='=_Part_' . md5(rand() . microtime());
        $this->headers = 'MIME-Version: 1.0' . "\r\n";
    }

    public function setTo($name,$email){
```

```
        $this->to['email'] = $email;
        $this->to['name'] = $name;
    }

    public function setFrom($email, $name){
        $this->from['email'] = $email;
        $this->from['name'] = $name;
    }

    public function setHeader($key, $value){
        if(!isset($this->headers[$key])){
            $this->headers_args[$key] = $value;
        }
    }

    public function setTextHtml($content){
        $this->headers.= 'Content-Type: text/html; charset='. strtoupper($this->charset).'; format=flowed' ."\r\n";
        $this->message.= $this->encodeMessage($content) . "\r\n";
    }

    public function setTextPlain($content){
        $this->headers.= 'Content-Type: text/plain; charset='. strtoupper($this->charset) ."\r\n";
        $this->message.= $this->encodeMessage($content) . "\r\n";
    }

    private function encodeMessage($message){
        switch($this->encoding){
            case 'base64':
                $message = chunk_split(base64_encode($this->setCharet($message)));
                $this->headers.= 'Content-Transfer-Encoding: '.$this->encoding."\n";
            break;
            default : $message = $this->setCharet($message); break;
        }
    return $message;
    }

    # 문자 출력 값이 utf-8인지 체크 후 변환하기
    public function setCharet($msg){
        if($this->charset=='euc-kr') return $this->isEuckrChg($msg);
        return $this->isUTF8Chg($msg);
    }

    #@ return String
    # utf-8 문자인지 체크 /--
    public function isUTF8Chg($msg)
    {
        if(iconv("utf-8","utf-8",$msg)==$msg) return $msg;
        else return iconv('euc-kr','utf-8',$msg);
    }

    #@ return String
    # euc-kr 문자인지 체크 /--
    public function isEuckrChg($msg)
    {
        if(iconv("euc-kr","euc-kr",$msg)==$msg) return $msg;
        else return iconv('utf-8','euc-kr',$msg);
    }

    public function send($subject)
    {
        # to
        $to = '=?'.strtoupper($this->charset).'?B?'.base64_encode($this->setCharet($this->to['name'])).'?= <'.$this->to['email'].'>'. "\n";
        //$to = base64_encode($this->setCharet($this->to['name'])).'<'.$this->to['email'].'>';
        //$this->headers .='To: '.$to. "\n";

        # from
        $this->headers .= 'From: =?'.strtoupper($this->charset).'?B?'.base64_encode($this->setCharet($this->from['name'])).'?= <'.$this->from['email'].'>'. "\n";
        //$this->headers .= 'Reply-To: =?'.strtoupper($this->charset).'?B?'.base64_encode($this->setCharet($this->from['name'])).'?= <'.$this->from['email'].'>'."\n";

        # subject
        $subject= '=?'.strtoupper($this->charset).'?B?'.base64_encode($this->setCharet($subject)).'?=';

        #send
        if(mail($to,$subject,$this->message,$this->headers)){ return true; }else{
            throw new \ErrorException('mail send error');
        }
    }
}
```

--- 파일 경로: classes/Model.php ---

```php
<?php
namespace Flex\Banana\Classes;

class Model implements \ArrayAccess {
    public const __version = '2.0';
    private $args = [];

    public function __construct(?array $args = []) {
        if (is_array($args) && count($args)) {
            $this->args = $args;
        }
    }

    public function fetch(): array {
        return $this->args;
    }

    public function &__get(string $propertyName) {
        if (!array_key_exists($propertyName, $this->args)) {
            $this->args[$propertyName] = [];
        }
        return $this->args[$propertyName];
    }

    public function __set(string $propertyName, $value) {
        $this->args[$propertyName] = $value;
    }

    public function __isset(string $name): bool {
        return isset($this->args[$name]);
    }

    public function __unset(string $name): void {
        unset($this->args[$name]);
    }

    public function offsetSet(mixed $offset, mixed $value): void {
        if (is_null($offset)) {
            $this->args[] = $value;
        } else {
            $this->args[$offset] = $value;
        }
    }

    public function offsetExists(mixed $offset): bool {
        return isset($this->args[$offset]);
    }

    public function offsetUnset(mixed $offset): void {
        unset($this->args[$offset]);
    }

    public function &offsetGet(mixed $offset): mixed {
        if (!isset($this->args[$offset])) {
            $this->args[$offset] = [];
        }
        return $this->args[$offset];
    }

    public function __destruct() {
        unset($this->args);
    }
}
```

--- 파일 경로: classes/Paging/Relation.php ---

```php
<?php
```

```
namespace Flex\Banana\Classes\Paging;

class Relation
{
    public const __version  = '2.0';
    private $page           = 1;        # 현제 페이지
    private $totalPage      = 0;        # 총페이지
    private $qLimitStart    = 0;        # query LIMIT [0],[]
    private $qLimitEnd      = 0;        # query LIMIT [],[0]
    private $totalBlock     = 0;
    private $blockCount     = 0;
    private $blockLimit     = 10;
    private $blockStartPage = 0;        # 블록 시작페이지
    private $blockEndPage   = 0;        # 블록 끝페이지
    private $pageLimit      = 0;
    private $totalRecord    = 0;        # 총레코드 수

    private $relation = ['first'=> 0,'pre'=> 0,'next'=> 0,'last'=> 0];
    private $relation_current = [];

    /**1
     * 필요한 기본값 등록
     * @param $totalRecord    : 총 레코드 갯수
     * @param $page           : 요청 페이지
     */
    public function __construct(int $totalRecord, int $page){
        $this->totalRecord    = $totalRecord;
        $this->page           = (!empty($page)) ? $page : 1;
    }

    # 2 한페이지에 출력할 레코드 갯수
    public function query(int $pagecount=10, int $blockLimit=10) : Relation
    {
        $this->blockLimit =$blockLimit;
        $this->totalPage  =@ceil($this->totalRecord/$pagecount);

        if($this->totalRecord ==0){
            $this->qLimitStart =0;
            $this->qLimitEnd   =0;
        }else{
            $this->qLimitStart =$pagecount * ($this->page-1);
            $this->qLimitEnd   =$pagecount;
        }

        $this->totalBlock     = ceil($this->totalPage/$this->blockLimit);
        $this->blockCount     = ceil($this->page/$this->blockLimit); // 현재속해 있는 block count
        $this->blockStartPage = ($this->blockCount-1) * $this->blockLimit;
        $this->blockEndPage   = $this->blockCount*$this->blockLimit;

        if($this->totalBlock <=$this->blockCount) {
            $this->blockEndPage = $this->totalPage;
        }

        $this->pageLimit = $pagecount;
    return $this;
    }

    #@ 3
    # 출력
    public function build() : Relation
    {
        $this->rewindPage();
        $this->prevPage();
        $this->currentPage();
        $this->nextPage();
        $this->lastPage();
    return $this;
    }

    #@void 현재페이지 출력
    private function currentPage() : void
    {
        $s_page =$this->blockStartPage + 1;
        for($i = $s_page; $i<=$this->blockEndPage; $i++)
        {
            $this->relation_current[] = $i;
        }
    }
    #이전페이지
```

```
    private function prevPage() : void{
        if($this->page > 1 && $this->page <= $this->totalPage){
            $this->relation['pre'] = $this->page -1;
        }
    }

    #다음페이지
    private function nextPage() : void{
        if($this->page >0 && $this->page < $this->totalPage){
            $this->relation['next'] = $this->page + 1;
        }
    }

    #처음페이지
    private function rewindPage() : void{
        if($this->page > 1 && $this->page <= $this->totalPage){
            $this->relation['first'] = 1;
        }
    }

    #마지막페이지
    private function lastPage() : void{
        if($this->page > 0 && $this->page <= ($this->totalPage-1)){
            $this->relation['last'] = $this->totalPage;
        }else{
            $this->relation['last'] = 0;
        }
    }

    # 프라퍼티 값 포함한 가져오기
    public function __get($propertyName){
        if(property_exists(__CLASS__,$propertyName)){
            $result = $this->{$propertyName};
            if($propertyName =='totalPage'){
                if($result==0){
                    $result = 1;
                }
            }
        return $result;
        }
    }

    # 프라퍼티 값 변경하기
    public function __set($propertyName, $valuez){
        if(property_exists(__CLASS__,$propertyName)){
            return $this->{$propertyName} = $valuez;
        }
    }

    #@ array
    #first : 0
    #pre : 0
    #next : 3
    #last : 5
    #chanel : [1,2,3]
    #페이징 채널 배열 출력
    public function paging() : array
    {
        $result = array_merge($this->relation,array('chanel'=>$this->relation_current));
    return $result;
    }
}
```

--- 파일 경로: classes/R.php ---

```
<?php
namespace Flex\Banana\Classes;

use ArrayObject;
use Exception;
use JsonException;

final class R
{
```

```
public const __version = '2.3.2';
public static string $language = ''; // 국가코드

# resource 값
public static array $sysmsg   = [];
public static array $strings  = [];
public static array $arrays   = [];
public static array $tables   = [];
public static array $numbers  = [];

private static array $cache = [];

# 배열값 추가 등록
public static function init(string $lang = ''): void
{
    self::$language = trim($lang);
}

# 특정 리소스 키에 해당하는 값 리턴
protected static function get(string $query, string $fieldname): mixed
{
    $cacheKey = "{$query}_{$fieldname}_" . self::$language;
    if (isset(self::$cache[$cacheKey])) {
        return self::$cache[$cacheKey];
    }

    $target = self::getTarget($query);
    $result = $target[self::$language][$fieldname] ?? null;

    self::$cache[$cacheKey] = $result;
    return $result;
}

# 특정 리소스에 전체 값 바꾸기
public static function set(string $query, array $data): void
{
    $target = &self::getTarget($query);
    $target[self::$language] = $data;
    self::clearCache($query);
}

protected static function fetch(string $query): array
{
    $cacheKey = "{$query}_fetch_" . self::$language;
    if (isset(self::$cache[$cacheKey])) {
        return self::$cache[$cacheKey];
    }

    $target = self::getTarget($query);
    $result = $target[self::$language] ?? [];

    self::$cache[$cacheKey] = $result;
    return $result;
}

# 특정리소스의 키에 해당하는 값들을 배열로 돌려받기
protected static function selectR(array $params): array
{
    $cacheKey = md5(serialize($params) . self::$language);
    if (isset(self::$cache[$cacheKey])) {
        return self::$cache[$cacheKey];
    }

    $argv = [];
    foreach ($params as $query => $fieldname) {
        $columns = str_contains($fieldname, ",") ? explode(",", $fieldname) : [$fieldname];
        foreach ($columns as $columname) {
            $argv[$columname] = self::get($query, trim($columname));
        }
    }

    self::$cache[$cacheKey] = $argv;
    return $argv;
}

public static function __callStatic(string $query, array $args = []): mixed
{
    return match(true) {
        strtolower($query) === 'dic' && !empty($args) => (object)$args[0],
```

```
        $query === 'fetch' && isset($args[0]) && is_string($args[0]) => self::fetch($args[0]),
        $query === 'select' && !empty($args) => self::selectR($args[0]),
        isset($args[0]) && is_string($args[0]) => self::get($query, $args[0]),
        isset($args[0]) && is_array($args[0]) => self::mergeData($query, $args[0]),
        default => null
    };
}

private static function &getTarget(string $query): array
{
    if (in_array($query, ['sysmsg', 'strings', 'numbers', 'arrays', 'tables'])) {
        return self::${$query};
    }
}

# 배열값 추가 머지
private static function mergeData(string $query, array $args): void
{
    $target = &self::getTarget($query);
    $target[self::$language] = ($target[self::$language] ?? []) + $args;
    self::clearCache($query);
}

# 데이터 로딩된 상태인지 체크
private static function is(string $query): bool
{
    $target = self::getTarget($query);
    return isset($target[self::$language]);
}

public static function parser(string $filename, string $query): void
{
    if (!$query) {
        throw new Exception(__CLASS__ . ' :: ' . __LINE__ . ' ' . $query . ' is null');
    }

    if (!self::is($query)) {
        $real_filename = self::findLanguageFile($filename);
        $storage_data = file_get_contents($real_filename);
        if ($storage_data) {
            $data = self::filterJSON($storage_data, true);
            if (!is_array($data)) {
                throw new Exception(__CLASS__ . ' :: ' . __LINE__ . ' ' . $real_filename . ' / ' . $data);
            }
            self::mergeData($query, $data);
        }
    }
}

public static function filterJSON(string $json, bool $assoc = false, int $depth = 512, int $options = 0): mixed
{
    $json = preg_replace(['/\/\/.*$/m', '/\/\*.*?\*\//s'], '', $json);
    $json = preg_replace('/\s+/', ' ', $json);
    $json = preg_replace('/([{,])(\s*)([^"]+?)\s*:/', '$1"$3":', $json);

    try {
        return json_decode($json, $assoc, $depth, JSON_THROW_ON_ERROR | $options);
    } catch (JsonException $e) {
        return $e->getMessage();
    }
}

public static function findLanguageFile(string $filename): string
{
    $path_parts = pathinfo($filename);
    $nation_filename = sprintf('%s/%s_%s.%s',
        $path_parts['dirname'],
        $path_parts['filename'],
        self::$language,
        $path_parts['extension']
    );
    return file_exists($nation_filename) ? $nation_filename : $filename;
}

private static function clearCache(string $query): void
{
    foreach (self::$cache as $key => $value) {
        if (strpos($key, $query) === 0) {
            unset(self::$cache[$key]);
```

```
            }
        }
    }

    public function __destruct()
    {
        foreach (['sysmsg', 'strings', 'numbers', 'arrays', 'tables', 'r', 'cache'] as $property) {
            unset(self::${$property});
        }
    }
}
```

--- 파일 경로: classes/Random/Random.php ---

```
<?php
namespace Flex\Banana\Classes\Random;

# purpose : 랜덤문자 만들기
class Random {
    public const __version = '0.7';
    protected array $specialChars = ['!', '@', '#', '$', '*', '_', '-'];
    protected array $characters = [];

    public function __construct(array $characters = []){
        if(is_array($characters) && count($characters)){
            $this->characters = $characters;
        }else{
            if(!count($this->characters)){
                $this->characters = array_merge(range('A', 'Z'), range(0, 9));
            }
        }
    }

    # 숫자로 정해진 범위의 숫자로 난수를 만드어 낸다
    # min : 시작범위, max : 끝범위
    # 리턴 길이
    public function _number(int $min=0,int $max=9, int $length=1) : int
    {
        $result = '';
        // 첫 번째 숫자는 0이 아닌 숫자로 시작
        $result = (string)random_int(max(1, $min), $max);

        for($i=1; $i<$length; $i++){
            $result .= random_int($min,$max);
        }

    return (int) $result;
    }

    # 특수문자 랜덤
    public function _specialChars(int $length = 1): string {
        $result = '';
        $charCount = count($this->specialChars);

        for ($i = 0; $i < $length; $i++) {
            $result .= $this->specialChars[random_int(0, $charCount - 1)];
        }
        return $result;
    }

    # 배열중에서 갯수 만큼 추출해 내기
    public function _string(int $length=1, bool $includeSpecialChars = false) : string
    {
        $result = '';

        # 특수문자 포함 여부
        if($includeSpecialChars){
            $specialCharsCount = count($this->specialChars);
            $this->characters = array_merge($this->characters, $this->_specialChars( $specialCharsCount ));
        }

        # 갯수만큼 추출
        $array_keys = ($length==1) ? [array_rand($this->characters,$length)] : array_rand($this->characters,$length);
        # 결과
```

```
        $cnt = count($array_keys);
        for($i=0; $i<$cnt; $i++){
            $result .= $this->characters[$array_keys[$i]];
        }
    return $result;
    }
}
```

--- 파일 경로: classes/Request/FormValidation.php ---

```
<?php
namespace Flex\Banana\Classes\Request;

use Flex\Banana\Classes\R;
use Flex\Banana\Classes\Request\Validation;

# 폼체크
class FormValidation extends Validation
{
    public const __version = '2.2';
    protected bool $required = false;
    protected $shouldSkipAllValidations = false;
    protected $conditions = [];

    public function __construct(
        protected string $fieldName,
        protected string $title,
        protected mixed $value
    ){
        parent::__construct($value);
    }

    # 조건문 생성기
    public function when($condition): FormValidation
    {
        if (is_callable($condition)) {
            $result = $condition();
        } elseif (is_bool($condition)) {
            $result = $condition;
        } else {
            $result = false;
        }

        if (!$result) {
            $this->shouldSkipAllValidations = true;
        }

        return $this;
    }

    # 조건문 이후의 항목 통과 체크용 메소드
    protected function shouldSkipValidation(): bool
    {
        return $this->shouldSkipAllValidations;
    }

    # 필수 옵션
    public function null () : FormValidation
    {
        if ($this->shouldSkipValidation()) {
            return $this;
        }

        $this->required = true;
        if(parent::isNull()) {
            $this->error_report($this->fieldName, 'e_null', sprintf("%s %s", $this->title, R::sysmsg('e_null')));
        }
    return $this;
    }

    # 길이
    public function length (int $min, int $max) : FormValidation
    {
        if ($this->shouldSkipValidation()) {
```

```
        return $this;
    }

    if($this->str && !parent::isStringLength([$min, $max])){
        $err_msg =sprintf( R::sysmsg('e_string_length'), $min, $max );
        $this->error_report($this->fieldName, 'e_string_length', sprintf("%s %s", $this->title, $err_msg));
    }
return $this;
}

# 특수 문자 있으면 reject
public function disliking (array $arguments=[]) : FormValidation
{
    if ($this->shouldSkipValidation()) {
        return $this;
    }

    if($this->str){
        # 허용된 특수문자를 제거 한다.
        if(is_array($arguments)){
            foreach($arguments as $etcstr){
                $this->str = str_replace($etcstr,'', $this->str);
            }
        }

        if(!parent::isEtcString()){
            $etc_msg = (count($arguments)) ? '['.implode(',',$arguments).']' : '';
            $err_msg = sprintf(R::sysmsg('e_etc_string'),$etc_msg);
            $this->error_report($this->fieldName, 'e_etc_string', sprintf("%s %s", $this->title, $err_msg));
        }
    }
return $this;
}

# 특수 문자 없으면 에러 (최소 1개이상 입력)
public function liking (array $arguments=[]) : FormValidation
{
    if ($this->shouldSkipValidation()) {
        return $this;
    }

    if($this->str && parent::isEtcString()){
        $this->error_report($this->fieldName, 'e_chk_etc_string', sprintf("%s %s", $this->title, R::sysmsg('e_chk_etc_string')));
    }
return $this;
}

# 공백체크
public function space () : FormValidation
{
    if ($this->shouldSkipValidation()) {
        return $this;
    }

    if($this->str && !parent::isSpace()){
        $this->error_report($this->fieldName, 'e_spaces', sprintf("%s %s", $this->title,R::sysmsg('e_spaces')));
    }
return $this;
}

# enum
public function enum (array $arguments=[]) : FormValidation
{
    if ($this->shouldSkipValidation()) {
        return $this;
    }

    if($this->str){
        if(array_search($this->str, $arguments) === false)
        $this->error_report($this->fieldName, 'e_enum', sprintf("%s %s", $this->title,R::sysmsg('e_enum')));
    }
return $this;
}

# 영문또는 숫자 만
public function alnum () : FormValidation
{
    if ($this->shouldSkipValidation()) {
        return $this;
```

```
    }

    if($this->str && !ctype_alnum($this->str)){
        $this->error_report($this->fieldName, 'e_ctype_alnum', sprintf("%s %s", $this->title,R::sysmsg('e_ctype_alnum')));
    }
return $this;
}

# 연속반복문자 체크
public function repeat(int $max) : FormValidation
{
    if ($this->shouldSkipValidation()) {
        return $this;
    }

    if($this->str && !parent::isSameRepeatString($max)){
        $err_msg = sprintf(R::sysmsg('e_same_repeat_string'), $max);
        $this->error_report($this->fieldName, 'e_same_repeat_string', sprintf("%s %s", $this->title,$err_msg));
    }
return $this;
}

# 숫자인지 체크
public function number() : FormValidation
{
    if ($this->shouldSkipValidation()) {
        return $this;
    }

    if($this->str && !parent::isNumber()){
        $this->error_report($this->fieldName, 'e_number', sprintf("%s %s", $this->title,R::sysmsg('e_number')));
    }
return $this;
}

# 영어만 체크
public function alphabet () : FormValidation
{
    if ($this->shouldSkipValidation()) {
        return $this;
    }

    if($this->str && !parent::isAlphabet()){
        $this->error_report($this->fieldName, 'e_alphabet', sprintf("%s %s", $this->title,R::sysmsg('e_alphabet')));
    }
return $this;
}

# 알파벳인지 대문자 인지 체크
public function upal () : FormValidation
{
    if ($this->shouldSkipValidation()) {
        return $this;
    }

    if($this->str && !parent::isUpAlphabet()){
        $this->error_report($this->fieldName, 'e_up_alphabet', sprintf("%s %s", $this->title,R::sysmsg('e_up_alphabet')));
    }
return $this;
}

# 알파벳인지 소문자 인지 체크
public function lowal () : FormValidation
{
    if ($this->shouldSkipValidation()) {
        return $this;
    }

    if($this->str && !parent::isLowAlphabet()){
        $this->error_report($this->fieldName, 'e_low_alphabet', sprintf("%s %s", $this->title,R::sysmsg('e_low_alphabet')));
    }
return $this;
}

# 첫글자가 알파벳인지 체크
public function firstal () : FormValidation
{
    if ($this->shouldSkipValidation()) {
        return $this;
```

```
    }

    if($this->str && !parent::isFirstAlphabet()){
        $this->error_report($this->fieldName, 'e_first_alphabet', sprintf("%s %s", $this->title,R::sysmsg('e_first_alphabet')));
    }
return $this;
}

# json 타입의 데이터인지 체크
public function jsonf() :FormValidation
{
    if ($this->shouldSkipValidation()) {
        return $this;
    }

    if($this->str && !parent::isJSON()){
        $this->error_report($this->fieldName, 'e_json', sprintf("%s %s", $this->title,R::sysmsg('e_json')));
    }
return $this;
}

# 날짜데이터인지 체크
public function datef() :FormValidation
{
    if ($this->shouldSkipValidation()) {
        return $this;
    }

    if($this->str && !parent::chkDate()){
        $this->error_report($this->fieldName,'e_date', sprintf("%s %s", $this->title,R::sysmsg('e_date')));
    }
return $this;
}

# 시간 데이터인지 체크
public function timef() :FormValidation
{
    if ($this->shouldSkipValidation()) {
        return $this;
    }

    if($this->str && !parent::chkTime()){
        $this->error_report($this->fieldName,'e_time', sprintf("%s %s", $this->title,R::sysmsg('e_time')));
    }
return $this;
}

# 시작날짜와 종료날짜 이 올바른지 체크
public function dateperiod (string $end_date) : FormValidation
{
    if ($this->shouldSkipValidation()) {
        return $this;
    }

    if($this->str){
        $this->str = $this->str.','.$end_date;
        if(!parent::chkDatePeriod_()){
            $this->error_report($this->fieldName, 'e_date_period',sprintf("%s %s", $this->title,R::sysmsg('e_date_period')));
        }
    }
return $this;
}

# 두 문자가 일치하는지 체크
public function equal (mixed $value) : FormValidation
{
    if ($this->shouldSkipValidation()) {
        return $this;
    }

    if($this->str){
        $this->str = $this->str.','.$value;
        if(!parent::equals()){
            $this->error_report($this->fieldName, 'e_equals', sprintf("%s %s", $this->title,R::sysmsg('e_equals')));
        }
    }
return $this;
}
# 이메일 데이터인지 체크
```

```
    public function email () : FormValidation
    {
        if ($this->shouldSkipValidation()) {
            return $this;
        }

        if($this->str && !filter_var($this->str, FILTER_VALIDATE_EMAIL)){
            $this->error_report($this->fieldName, 'e_formality', sprintf("%s %s", $this->title,R::sysmsg('e_formality')));
        }
    return $this;
    }

    # http:: url 데이터인지 체크
    public function url () : FormValidation
    {
        if ($this->shouldSkipValidation()) {
            return $this;
        }

        if($this->str && !filter_var($this->str, FILTER_VALIDATE_URL)){
            $this->error_report($this->fieldName, 'e_link_url', sprintf("%s %s", $this->title,R::sysmsg('e_link_url')));
        }
    return $this;
    }

    # 소수형 데이터 인지 체크
    public function floatf () : FormValidation
    {
        if ($this->shouldSkipValidation()) {
            return $this;
        }

        if($this->str && !is_float(floatval($this->str))){
            $this->error_report($this->fieldName, 'e_float', sprintf("%s %s", $this->title,R::sysmsg('e_float')));
        }
    return $this;
    }

    private function error_report(string $field, string $msg_code, string $msg)
    {
        throw new \Exception(strval(
            json_encode(
                ['result'=>'false','fieldname'=>$field,'msg_code'=>$msg_code,'msg'=>$msg],
                JSON_UNESCAPED_UNICODE
            )
        ));
    }
}
```

--- 파일 경로: classes/Request/Request.php ---

```
<?php
namespace Flex\Banana\Classes\Request;

class Request
{
    public const __version = '1.0.4';
    private array $params = [];
    private array $headers = [];
    public string $ip;
    public string $uri_path;
    public string $method;
    public string $port;

    public function __construct()
    {
        $this->ip = $this->getClientIp();
        $this->uri_path = $_SERVER['REQUEST_URI'] ?? '';
        $this->method = $_SERVER['REQUEST_METHOD'] ?? '';
        $this->port = $_SERVER['SERVER_PORT'] ?? '';
    }

    public function post(bool $is_trim = true): self
    {
```

```
    if (!empty($_POST)) {
        $this->trimParams($_POST, $is_trim);
    } else {
        $this->getInputContents($is_trim);
    }
    return $this;
}

public function input(bool $is_trim = true): self
{
    $this->getInputContents($is_trim);
    return $this;
}

public function patch(bool $is_trim = true): self
{
    $this->getInputContents($is_trim);
    return $this;
}

public function get(bool $is_trim = true): self
{
    $this->trimParams($_GET, $is_trim);
    return $this;
}

public function delete(bool $is_trim = true): self
{
    $this->trimParams($_GET, $is_trim);
    return $this;
}

public function trimParams(array $arg, bool $is_trim): void
{
    foreach ($arg as $k => $v) {
        if ($is_trim && !is_array($v)) {
            $v = trim($v);
        }
        $this->params[$k] = $v;
    }
}

private function getInputContents(bool $is_trim): void
{
    $post_data = file_get_contents('php://input');
    if ($post_data) {
        $post_json = json_decode($post_data, true);
        if (json_last_error() === JSON_ERROR_NONE) {
            $this->trimParams($post_json, $is_trim);
        } else {
            parse_str($post_data, $post_variables);
            if (!empty($post_variables)) {
                $this->trimParams($post_variables, $is_trim);
            }
        }
    }
}

public function getHeaders(): array
{
    if (empty($this->headers)) {
        if (function_exists('getallheaders')) {
            $this->headers = getallheaders();
        } elseif (function_exists('apache_request_headers')) {
            $this->headers = apache_request_headers();
        } else {
            foreach ($_SERVER as $name => $value) {
                if (str_starts_with($name, 'HTTP_')) {
                    $header_name = str_replace(' ', '-', ucwords(strtolower(str_replace('_', ' ', substr($name, 5)))));
                    $this->headers[$header_name] = $value;
                }
            }
        }
    }
    return $this->headers;
}

public function getHeaderLine(string $name): string
{
```

```
        return $this->headers[$name] ?? '';
    }

    public function fetch(): array
    {
        return $this->params;
    }

    private static function getClientIp(): string
    {
        return $_SERVER['HTTP_CLIENT_IP'] ??
            $_SERVER['HTTP_X_FORWARDED_FOR'] ??
            $_SERVER['HTTP_X_FORWARDED'] ??
            $_SERVER['HTTP_FORWARDED_FOR'] ??
            $_SERVER['HTTP_FORWARDED'] ??
            $_SERVER['REMOTE_ADDR'] ?? '';
    }

    public function __get(string $propertyName): mixed
    {
        return $this->params[$propertyName] ?? null;
    }

    public function __set(string $key, mixed $value): void
    {
        $this->params[$key] = $value;
    }

    public function __isset(string $name): bool
    {
        return isset($this->params[$name]);
    }
}
```

--- 파일 경로: classes/Request/Validation.php ---

```
<?php
namespace Flex\Banana\Classes\Request;

# purpose : 문자를 체크(Ascii 문자 코드를 활용하여) 한다 / preg,ereg 정규식 보다 훨 빠름
class Validation
{
    public const __version = '2.0';
    public string $str;
    public int $len = 0;

    public function __construct($s){
        $this->str = trim($s);
        if(!$this->isNull()){
            $this->len = strlen($s);
        }
    }

    # null 값인지 체크한다 [ 널값이면 : true / 아니면 : false ]
    public function isNull() : bool{
        $result = false;

        if(is_null($this->str) || $this->str==''){
            $result = true;
        }
    return $result;
    }

    # 문자와 문자사이 공백이 있는지 체크 [ 공백 있으면 : false / 없으면 : true ]
    public function isSpace(): bool{
        $str_split    = count(preg_split("/ /", $this->str)); //split("[[:space:]]+",$this->str);
        if($str_split > 1){
            return false;
        }
    return true;
    }

    # 연속적으로 똑같은 문자는 입력할 수 없다  [ 반복문자 max 이상이면 : false / 아니면 : true ]
    # ex : 010-111-1111,010-222-1111 형태제한
```

```
# max = 3; // 반복문자 3개 "초과" 입력제한
public function isSameRepeatString(int $max=3): bool{
    $result = true;
    $sameCount = 0;
    $preAsciiNumber = 0;
    for($i=0; $i < $this->len; $i++){
        if(isset($this->str[$i])){
            $asciiNumber = Ord($this->str[$i]);
            if( ($preAsciiNumber == $asciiNumber) && ($preAsciiNumber>0) ) $sameCount += 1;
            else $preAsciiNumber = $asciiNumber;

            if($sameCount==$max){
                $result = false;
                break;
            }
        }
    }
return $result;
}

# 숫자인지 체크 [ 숫자면 : true / 아니면 : false ]
# Ascii table = 48 ~ 57
public function isNumber(): bool{
    $result = true;
    for($i=0; $i < $this->len; $i++){
        if(isset($this->str[$i])){
            $asciiNumber = Ord($this->str[$i]);
            if($asciiNumber<47 || $asciiNumber>57){
                $result = false;
                break;
            }
        }
    }
return $result;
}

# 영문인지 체크 [ 영문이면 : true / 아니면 : false ]
# Ascii table = 대문자[75~90], 소문자[97~122]
public function isAlphabet(): bool{
    $result = true;
    for($i=0; $i < $this->len; $i++){
        if(isset($this->str[$i])){
            $asciiNumber = Ord($this->str[$i]);
            if(($asciiNumber>64 && $asciiNumber<91) || ($asciiNumber>96 && $asciiNumber<123)){}
            else{ $result = false; }
        }
    }
return $result;
}

# 영문이 대문자 인지체크 [ 대문자이면 : true / 아니면 : false ]
# Ascii table = 대문자[75~90]
public function isUpAlphabet(): bool{
    $result = true;
    for($i=0; $i < $this->len; $i++){
        if(isset($this->str[$i])){
            $asciiNumber = Ord($this->str[$i]);
            if($asciiNumber<65 || $asciiNumber>90){
                $result = false;
                break;
            }
        }
    }
return $result;
}

# 영문이 소문자 인지체크 [ 소문자면 : true / 아니면 : false ]
# Ascii table = 소문자[97~122]
public function isLowAlphabet(): bool{
    $result = true;
    for($i=0; $i < $this->len; $i++){
        if(isset($this->str[$i])){
            $asciiNumber = Ord($this->str[$i]);
            if($asciiNumber<97 || $asciiNumber>122){
                $result = false;
                break;
            }
        }
    }
```

```
return $result;
}

# 한글인지 체크한다 [ 한글이면 : true / 아니면 : false ]
# Ascii table = 128 >
public function isKorean(): bool{
    $result = false;
    for($i=0; $i < $this->len; $i++){
        if(isset($this->str[$i])){
            $asciiNumber = Ord($this->str[$i]);
            if($asciiNumber>128){
                $result = true;
                break;
            }
        }
    }
return $result;
}

# 특수문자 입력여부 체크 [ 특수문자 찾으면 : false / 못찾으면 : true ]
# space 공백은 자동 제외
public function isEtcString(): bool
{
    $result = true;
    for($i=0; $i < $this->len; $i++){
        if(isset($this->str[$i])){
            $asciiNumber = Ord($this->str[$i]);
            if( ($asciiNumber<48) && ($asciiNumber != 46 && $asciiNumber != 32) ){ $result = false; break; }
            else if($asciiNumber>57 && $asciiNumber<65){ $result = false; break; }
            else if($asciiNumber>90 && $asciiNumber<97){ $result = false; break; }
            else if($asciiNumber>122 && $asciiNumber<128){ $result = false; break; }
        }
    }
return $result;
}

# 첫번째 문자가 영문인지 체크한다[ 찾으면 : true / 못찾으면 : false ]
public function isFirstAlphabet(): bool{
    $result = true;
    $asciiNumber = Ord($this->str[0]);
    if(($asciiNumber>64 && $asciiNumber<91) || ($asciiNumber>96 && $asciiNumber<123)){}
    else{ $result = false; }
return $result;
}

# 문자길이 체크 한글/영문/숫자/특수문자/공백 전부포함
# min : 최소길이 / max : 최대길이 utf-8
public function isStringLength(array $arguments): bool
{
    $strCount = 0;
    $min = $arguments[0];
    $max = $arguments[1];
    $str =$this->str;
    for($i=0;$i<$this->len;$i++)
    {
        if(isset($str[$i])){
            $asciiNumber = Ord($str[$i]);
            if($asciiNumber<=127 && $asciiNumber>=0){ $strCount++; }
            else if($asciiNumber<=223 && $asciiNumber>=194){ $strCount++; $i+1; }
            else if($asciiNumber<=239 && $asciiNumber>=224){ $strCount++; $i+2; }
            else if($asciiNumber<=244 && $asciiNumber>=240){ $strCount++; $i+3; }
        }
    }

    if($strCount<$min) return false;
    else if($strCount>$max) return false;
    else return true;
}

# 날짜가 정확한 날짜인지 체크
# 날짜 데이타 타입 (2012-01-12)
public function chkDate() : bool{
    if(strpos($this->str,'-') ===false){
        return false;
    }
    $ymd_args = explode('-',$this->str);
    if(is_array($ymd_args)){
        foreach($ymd_args as $v){
            if(!is_numeric($v)){
```

```
                echo $v.PHP_EOL;
                return false;
            }
        }
        if(!checkdate($ymd_args[1],$ymd_args[2],$ymd_args[0])){
            return false;
        }
    }
return true;
}
# 시간이 정확한 시간에 속하는치 형태인지 체크
# 시간 데이터 타입(13:59:59)
public function chkTime(): bool{
    if(strpos($this->str,':') ===false){
        return false;
    }
    $pattern1 = '/^(0?\d|1\d|2[0-3]):[0-5]\d:[0-5]\d$/'; // 12:30:20
    $pattern2 = '/^(0?\d|1\d|2[0-3]):[0-5]\d$/'; // 12:30
    if ( (preg_match ($pattern1, $this->str)) || (preg_match ($pattern2, $this->str)) ){
        return true;
    }
return false;
}

# 두 날짜(2012-01-12 ~ 2012-01-13)가 정확한 기간인지 체크
# 뒤에 날짜가 앞에 날짜보다 작으면 안됨
# 두 날짜 데이타 타입(2012-01-12/2012-01-11)
public function chkDatePeriod_(): bool{
    $date = explode(',', $this->str);
    $s = explode('-', $date[0]);
    $e = explode('-', $date[1]);

    $sres= mktime(0,0,0,$s[1],$s[2],$s[0]);
    $eres= mktime(0,0,0,$e[1],$e[2],$e[0]);
    if($sres>$eres) return false;
return true;
}

# JSON String 값인지 체크
public function isJSON(): bool{
    json_decode($this->str);
    return (json_last_error() == JSON_ERROR_NONE);
}

# 두 문자나 값이 서로 같은지 비교
public function equals(): bool{
    $result = true;
    $str = explode(',', $this->str);

    if($str[0] != $str[1] ) $result = false;
return $result;
}
}
```

--- 파일 경로: classes/Route/DbRoute.php ---

```
<?php
namespace Flex\Banana\Classes\Route;

use Flex\Banana\Classes\Json\JsonDecoder;
use Flex\Banana\Classes\Log;
use Flex\Banana\Classes\Db\DbManager;
use Flex\Banana\Adapters\DbAdapter;
use Flex\Banana\Interfaces\RouteInterface;

class DbRoute extends DbAdapter implements RouteInterface
{
    private string $table;
    public function __construct(DbManager $db, string $table) {
        # parent
        parent::__construct( $db );
        $this->table = $table;
    }
    #@ RouteInterface
```

```
    public function getRoutes(): array
    {
        $routes = [];
        if($result = $this->db->table($this->table)->select("url,types,flow")->query()){
            while ($row = $result->fetch_assoc()){
                $routes[$row['url']] = [
                    'method' => strtoupper($row['types']),
                    'tasks' => JsonDecoder::toArray($row['flow'])
                ];
            }
        }

        return $routes;
    }
}
```

--- 파일 경로: classes/Route/JsonRoute.php ---

```
<?php
namespace Flex\Banana\Classes\Route;

use Flex\Banana\Classes\Json\JsonDecoder;
use Flex\Banana\Classes\Log;
use Flex\Banana\Interfaces\RouteInterface;

class JsonRoute implements RouteInterface
{
  public function __construct(
    private string $dir,
    private string $filename
  ) {}

  #@ RouteInterface
  # {$this->dir}/res/routes/index.json
  public function getRoutes(): array
  {
    $indexPath = sprintf("%s/%s", $this->dir, $this->filename);
    if (!file_exists($indexPath)) return [];
    $taskFiles = JsonDecoder::toArray(file_get_contents($indexPath));
    $routes = [];
    foreach ($taskFiles as $file) {
        $path = sprintf("%s/%s.json", $this->dir, $file);
        $routes = array_merge($routes, JsonDecoder::toArray(file_get_contents($path)));
    }
    return $routes;
  }
}
```

--- 파일 경로: classes/Route/RouteLoader.php ---

```
<?php
namespace Flex\Banana\Classes\Route;

use Flex\Banana\Classes\Log;
use Flex\Banana\Interfaces\RouteInterface;

final class RouteLoader
{
    private array $sources = [];

  public function addSource(RouteInterface $source): self {
    $this->sources[] = $source;
    return $this;
  }

    public function routes(): array {
    $merged = [];
    foreach ($this->sources as $source) {
      $merged = array_merge($merged, $source->getRoutes());
    }
```

```
        return $this->expandVersionedRoutes($merged);
    }

    /**
     * [/t1,v1]/path 형식 확장
     */
    private function expandVersionedRoutes(array $rawRoutes): array
    {
        $expanded = [];

        foreach ($rawRoutes as $routePattern => $config)
        {
            if (preg_match('#^\[(.*?)\](/.+)$#', $routePattern, $matches))
            {
                $prefixes = explode(',', $matches[1]);
                $path     = $matches[2];

                foreach ($prefixes as $prefix)
                {
                    $prefix   = rtrim($prefix, '/');
                    $fullPath = $prefix . $path;
                    $expanded[$fullPath] = $config;
                }
            } else {
                $normalizedPath = '/' . ltrim($routePattern, '/');
                $expanded[$normalizedPath] = $config;
            }
        }

        return $expanded;
    }
}
```

--- 파일 경로: classes/Sharding/ConsistentHashing.php ---

```
<?php
namespace Flex\Banana\Classes\Sharding;

use Flex\Banana\Interfaces\ShardingStrategyInterface;

final class ConsistentHashing implements ShardingStrategyInterface
{
    private array $ring = [];                  // 해시 링
    private array $weights = [];               // 서버별 가중치 기록
    private int $replicaUnit;                  // 기본 replica 단위
    private bool $sorted = false;

    public function __construct(int $replicaUnit = 3) {
        $this->replicaUnit = $replicaUnit;
    }

    public function addServer(string $group, string $server, int $weight = 1): void {
        $this->weights[$server] = $weight;
        $replicas = $this->replicaUnit * $weight;

        for ($i = 0; $i < $replicas; $i++) {
            $hash = $this->hash($server . ':' . $i);
            $this->ring[$hash] = $server;
        }
        $this->sorted = false;
    }

    public function removeServer(string $group, string $server): void {
        $weight = $this->weights[$server] ?? 1;
        $replicas = $this->replicaUnit * $weight;

        for ($i = 0; $i < $replicas; $i++) {
            $hash = $this->hash($server . ':' . $i);
            unset($this->ring[$hash]);
        }

        unset($this->weights[$server]);
        $this->sorted = false;
    }
```

```
    public function getServer(string $group, string $key): ?string {
        if (empty($this->ring)) {
            throw new \RuntimeException("No servers registered.");
        }

        if (!$this->sorted) {
            ksort($this->ring);
            $this->sorted = true;
        }

        $hash = $this->hash($key);
        foreach ($this->ring as $ringHash => $server) {
            if ($hash <= $ringHash) {
                return $server;
            }
        }
        return reset($this->ring); // 링 끝을 넘으면 처음부터
    }

    private function hash(string $key): int {
        return hexdec(substr(md5($key), 0, 8)); // 32비트 해시
    }
}
```

--- 파일 경로: classes/Sharding/JumpHashing.php ---

```
<?php
namespace Flex\Banana\Classes\Sharding;

use Flex\Banana\Interfaces\ShardingStrategyInterface;

final class JumpHashing implements ShardingStrategyInterface
{
  private array $servers = [];

  public function addServer(string $group, string $server, int $weight = 1): void {
    if (!in_array($server, $this->servers, true)) {
        $this->servers[] = $server;
    }
  }

  public function removeServer(string $group, string $server): void {
    $this->servers = array_values(array_filter(
      $this->servers,
      fn($s) => $s !== $server
    ));
  }

  public function getServer(string $group, string $key): ?string {
    $numServers = count($this->servers);
    if ($numServers === 0) {
      throw new \RuntimeException("No servers registered.");
    }

    // 'bcmath' 체크
    if (!extension_loaded('bcmath')) {
        throw new \RuntimeException("The BCMath extension is required for this JumpHashing implementation to work correctly. Please install and enable the 'bcm
    }

    $hash = $this->hash64_for_bcmath($key);
    $b = -1;
    $j = 0;

    // BCMath 연산을 위한 상수 (문자열)
    $multiplier    = '2862933555777941757';
    $increment     = '1';
    $modulus       = '18446744073709551616'; // 2^64 (uint64 래핑 흉내)
    $shift_divisor = '8589934592';           // 2^33
    $jump_dividend = '2147483648';           // 2^31

    while ($j < $numServers) {
        $b = $j;
        $hash = bcmod(bcadd(bcmul($hash, $multiplier), $increment), $modulus);
        $randomizer = bcadd(bcdiv($hash, $shift_divisor, 0), '1');
```

```
            $dividend = bcmul((string)($b + 1), $jump_dividend);
            $j = (int)bcdiv($dividend, $randomizer, 0);
        }

        return $this->servers[$b];
    }

    private function hash64_for_bcmath(string $key): string {
        $unsigned_crc = sprintf('%u', crc32($key));
        return bcadd($unsigned_crc, '4294967296');
    }
}
```

--- 파일 경로: classes/Sharding/ShardManager.php ---

```
<?php
namespace Flex\Banana\Classes\Sharding;

use Flex\Banana\Interfaces\ShardingStrategyInterface;

final class ShardManager {
    private static array $strategies = [];

    public static function use(string $group, ShardingStrategyInterface $strategy): void {
    self::$strategies[$group] = $strategy;
    }

    public static function addServer(string $group, string $server, int $weight = 1): void {
        self::strategy($group)->addServer($group, $server, $weight);
    }

    public static function removeServer(string $group, string $server): void {
        self::strategy($group)->removeServer($group, $server);
    }

    public static function getServer(string $group, string $key): ?string {
        return self::strategy($group)->getServer($group, $key);
    }

    private static function strategy(string $group): ShardingStrategyInterface {
        if (!isset(self::$strategies[$group])) {
            throw new \RuntimeException("No strategy defined for group: {$group}");
        }
        return self::$strategies[$group];
    }
}
```

--- 파일 경로: classes/Strings/StringTools.php ---

```
<?php
namespace Flex\Banana\Classes\Strings;

class StringTools
{
    public const __version = '0.2.2';
    public function __construct(private string $data=''){}

    # convert 10진 to string
    public function ascii2String () : StringTools
    {
        if(trim($this->data))
        {
            $cdata = '';
            $len = strlen($this->data);
            for($i=0; $i<=$len ; $i+=2){
                $charno = substr($this->data,$i,2);
                if($charno>=33 && $charno <= 99){ $cdata .= chr($charno); }
                else {
                    $charno = substr($this->data,$i,3);
                    if($charno =100 && $charno <= 127){ $cdata .= chr($charno); $i++;}
```

```
                }
            }

            $this->data = $cdata;
        }

    return $this;
    }

    # convert 16진 to 10진
    public function hex2Ascii () : StringTools
    {
        if(trim($this->data))
        {
            $cdata = '';
            $len = strlen($this->data)-1;
            for ($i=0; $i < $len; $i+=2){
                $v = base_convert($this->data[$i].$this->data[$i+1], 16, 10);
                if($v != '0'){
                    $cdata .= $v;
                }
            }

            $this->data = $cdata;
        }

    return $this;
    }

    # convert string to ASCII
    public function string2Ascii() : StringTools
    {
        if(trim($this->data))
        {
            $cdata = '';
            $len = strlen($this->data);
            for($i = 0; $i < $len; $i++) {
                $cdata .= ord($this->data[$i]);
            }
            $this->data = $cdata;
        }
        return $this;
    }

    # convert ASCII to 16진 (hex)
    public function ascii2Hex() : StringTools
    {
        if(trim($this->data))
        {
            $cdata = '';
            $len = strlen($this->data);
            for($i = 0; $i < $len; $i += 3) {
                $ascii = substr($this->data, $i, 3);
                $cdata .= sprintf("%02x", $ascii);
            }
            $this->data = $cdata;
        }
        return $this;
    }

    public function __get(string $propertyName) : mixed{
        $result = [];
        if(property_exists($this,$propertyName)){
            $result = $this->{$propertyName};
        }
    return $result;
    }
}
```

--- 파일 경로: classes/TaskFlow.php ---

```
<?php
namespace Flex\Banana\Classes;
use Flex\Banana\Classes\Model;
```

```
final class TaskFlow extends Model
{
  public const __version = '1.2.2';
  private mixed $active = null;
  private array $adapters = [];

  private $errorCallback = null;

  public function __construct(?array $args = []) {
     parent::__construct($args);
  }

  public function do(mixed $instance): mixed
  {
    if ($instance instanceof \Closure) {
      try {
         $instance($this);
         return $this;
      } catch (\Throwable $e) {
         Log::e($e->getMessage() . "\n" . $e->getTraceAsString());
         if (is_callable($this->errorCallback)) {
            call_user_func($this->errorCallback, $e);
         }
         throw $e;
      }
    }

    $this->active = $instance;
    return $this;  // 변경: 클로저가 아닌 경우 $instance($this) 제거
  }

  public function adapter(string $name){
    return $this->adapters[$name] ?? null;
  }

  public function registerAdapter(object $adapter): static
  {
    if (is_object($adapter)) {
      $fullClass = get_class($adapter);
      $className = substr(strrchr($fullClass, '\\'), 1);
      $this->adapters[$className] = $adapter;
    } else {
      throw new \InvalidArgumentException("Invalid arguments for registerAdapter()");
    }

    return $this;
  }

  public function onError(callable $callback): static
  {
    $this->errorCallback = $callback;
    return $this;
  }

  public function __destruct() {
    parent::__destruct();
    unset($this->active);
    unset($this->errorCallback);
  }
}
```

--- 파일 경로: classes/Text/TextKeyword.php ---

```
<?php
namespace Flex\Banana\Classes\Text;

# purpose : 문자을 변경하거나 더하거나 등 가공하는 역할을 한다.
class TextKeyword
{
   public const __version = '1.1';
   const CHARSET = 'utf-8';
   private $value;
   private array $allow_tags = [];
   # 키워드 중 지우고 싶은 글자 및 단어
```

```
protected array $filter_words = [];

# 키워드 중 끝 -1 글자 지우기
protected array $filter_end_words = [];

public function __construct(string $keyword, array $allow_tags=[]){
    if($keyword && $keyword !=''){
        # 문자 특수 문자
        if(is_array($allow_tags) && count($allow_tags)){
            $this->allow_tags = $allow_tags;
        }
        $this->value = $keyword;
        $this->cleanWord();
    }
}

# 특수문자 제거 및 단어별 배열로 리턴
private function cleanWord() : TextKeyword
{
    # 한글 영어 숫자만 추출
    $pattern = '/([\xEA-\xED][\x80-\xBF]{2}|[a-zA-Z0-9]';
    if(count($this->allow_tags)){
        # 허용된 특수 문자
        $pattern .= '|[';
        foreach($this->allow_tags as $etcstr){
            $pattern .= '\\'.$etcstr;
        }
        $pattern .= ']';
    }
    $pattern .= ')+/';

    # 클린
    $keywords = $this->value;
    preg_match_all($pattern, $keywords, $match);
    $keywords = $match[0];
    if(is_array($keywords)){
        foreach($keywords as $n => $w)
        {
            # 영어만 추출
            preg_match_all("|(?<eng>[A-Za-z]+)|su", $w, $out);
            $eng = (isset($out['eng'][0])) ? $out['eng'][0] : '';
            if($eng){
                // echo $eng;
                # 발견된 단어에서 영어만 삭제
                $keywords[$n] = strtr($w, [$eng=>'']);
                # 발견된 영단어 추가
                $keywords[] = $eng;
            }
        }
    }

    $this->value = array_filter(array_unique($keywords));
return $this;
}

# 분리된 단어중에서 필터 단어로 등록된 단어 지운 후 리턴
/**
 * filter_words : 특정 문자를 특정문자로 변환
 * filter_end_words : 마지막 끝 글자를 특정문자로 변환
 */
public function filterCleanWord(array $filter_words =[], array $filter_end_words =[]) : TextKeyword
{
    # init
    if(is_array($filter_words) && count($filter_words)){
        $this->filter_words = $filter_words;
    }

    if(is_array($filter_end_words) && count($filter_end_words)){
        $this->filter_end_words = $filter_end_words;
    }

    # 필터
    $argv = (is_array($this->value)) ? $this->value : [$this->value];
    $data = array();
    foreach($argv as $w)
    {
        $s = strtr($w, $this->filter_words);
        if($s && $s !='')
        {
```

```
                $es = mb_substr($s, -1, NULL, TextKeyword::CHARSET);
                if (in_array($es, $this->filter_end_words)) {
                    $elen = mb_strlen($s, TextKeyword::CHARSET) - 1;
                    $data[] = mb_substr($w, 0, $elen, TextKeyword::CHARSET);
                }else{
                    $data[] = $s;
                }
            }
        }
        if(count($data)>0){
            $this->value = array_unique($data);
        }
    return $this;
    }

    public function __get(string $propertyName){
        $result = [];
        if(property_exists($this,$propertyName)){
            $result = $this->{$propertyName};
        }
    return $result;
    }
}
```

--- 파일 경로: classes/Text/TextUtil.php ---

```
<?php
namespace Flex\Banana\Classes\Text;

class TextUtil
{
    public const __version = '1.2';
    private string $value;
    private array $choseong = [
            'ㄱ', 'ㄲ', 'ㄴ', 'ㄷ', 'ㄸ', 'ㄹ', 'ㅁ', 'ㅂ', 'ㅃ', 'ㅅ',
            'ㅆ', 'ㅇ', 'ㅈ', 'ㅉ', 'ㅊ', 'ㅋ', 'ㅌ', 'ㅍ', 'ㅎ'
    ];

    public function __construct(string $s)
    {
        // 필수 mbstring 함수가 없는 경우 예외 발생
        if (!extension_loaded('mbstring')) {
        throw new \Exception('The mbstring extension is required for TextUtil to function correctly.');
    }
        $this->value = $s;
    }

    public function append(string|int $s): self
    {
            $this->value .= $s;
            return $this;
    }

    public function prepend(string|int $s): self
    {
            $this->value = $s . $this->value;
            return $this;
    }

    /**
     * 문자를 지정된 길이부터 특정 문자로 변경
     * @param int $startNumber 시작 위치 (1부터 시작)
     * @param int $length      변경할 길이
     * @param string $chgString 변형될 문자
     * @return self
     */
    public function replace(int $startNumber, int $length, string $chgString): self
    {
            $start_index = $startNumber - 1;
            $prefix = mb_substr($this->value, 0, $start_index, 'UTF-8');
            $suffix = mb_substr($this->value, $start_index + $length, null, 'UTF-8');
            $masked = str_repeat($chgString, $length);

            $this->value = $prefix . $masked . $suffix;
```

```
        return $this;
    }

    /**
     * 문자열을 원하는 너비로 자르기
     * @param int $width 자를 너비 (한글은 2, 영문/숫자는 1로 계산됨)
     * @param bool $appendEllipsis ... 추가 여부
     * @param string $strip_tags 제거하지 않을 태그
     * @return self
     */
    public function cut(int $width, bool $appendEllipsis = true, string $strip_tags = ''): self
    {
        $str = strip_tags($this->value, $strip_tags);
        $marker = $appendEllipsis ? '...' : '';

        // mb_strimwidth는 지정된 너비보다 길 경우에만 자르고 마커를 붙임
        $this->value = mb_strimwidth($str, 0, $width, $marker, 'UTF-8');
        return $this;
    }

    public function numberf(string $str='-') : self
    {
        $result = preg_replace("/[^0-9]*/s", "", $this->value);
        $patterns = [
            10 => '/(\d{3})(\d{3})(\d{4})/',
            11 => '/(\d{3})(\d{4})(\d{4})/',
        ];
        $length = strlen($result);
        if(isset($patterns[$length])){
            $this->value = preg_replace($patterns[$length], '\1'.$str.'\2'.$str.'\3', $result);
        }
        return $this;
    }

    /**
     * 모든 문자의 첫 글자 또는 한글 초성만 추출하기
     * @return self
     */
    public function extractFirstChar(): self
    {
        $char = mb_substr($this->value, 0, 1, 'UTF-8');

        if (preg_match('/^\p{Hangul}$/u', $char)) {
            $code = unpack('V', iconv('UTF-8', 'UCS-4LE', $char))[1];
            $unicodeOffset = $code - 0xAC00;
            $choseongIndex = floor($unicodeOffset / 588); // 588 = 21 * 28
            $this->value = $this->choseong[$choseongIndex];
        } else {
            $this->value = $char;
        }
        return $this;
    }

    public function __get(string $propertyName)
    {
        if (property_exists($this, $propertyName)) {
            return $this->{$propertyName};
        }
        return null;
    }
}
```

--- 파일 경로: classes/Uuid/UuidGenerator.php ---

```
<?php
namespace Flex\Banana\Classes\Uuid;

class UuidGenerator
{
    public const __version = '1.3.1';
    public function __construct(){
    }

    #@ String
```

```
public function v3(string $uuid, string $keyname) : mixed
{
    if(!$this->is_valid($uuid)) return false;

    $nhex = str_replace(array('-','{','}'), '', $uuid);
    $nstr = '';

    for($i = 0; $i < strlen($nhex); $i+=2) {
        $nstr .= chr(hexdec($nhex[$i].$nhex[$i+1]));
    }

    $hash = md5($nstr . $keyname);

    return sprintf('%08s-%04s-%04x-%04x-%12s',
        substr($hash, 0, 8),
        substr($hash, 8, 4),
        (hexdec(substr($hash, 12, 4)) & 0x0fff) | 0x3000,
        (hexdec(substr($hash, 16, 4)) & 0x3fff) | 0x8000,
        substr($hash, 20, 12)
    );
}

#@ String
# GenerateUUID V4
# prekey 에 timestamp, ymdhis, microtime(date('YmdHis') . substr((string)microtime(), 2, 6)) 를 사용할 경우 asc, desc 정렬이 가능함
public function v4(?string $prekey=null)
{
    $uuid = sprintf('%04x%04x-%04x-%04x-%04x-%04x%04x%04x',
        mt_rand(0, 0xffff), mt_rand(0, 0xffff),
        mt_rand(0, 0xffff),
        mt_rand(0, 0x0fff) | 0x4000,
        mt_rand(0, 0x3fff) | 0x8000,
        mt_rand(0, 0xffff), mt_rand(0, 0xffff), mt_rand(0, 0xffff)
    );

    return ($prekey !== null && $prekey) ? $prekey.'-'.$uuid : $uuid;
}

#@ String
public function v5(string $uuid, string $keyname) : mixed
{
    if(!$this->is_valid($uuid)) return false;

    $nhex = str_replace(array('-','{','}'), '', $uuid);
    $nstr = '';

    for($i = 0; $i < strlen($nhex); $i+=2) {
        $nstr .= chr(hexdec($nhex[$i].$nhex[$i+1]));
    }

    $hash = sha1($nstr . $keyname);

    return sprintf('%08s-%04s-%04x-%04x-%12s',
        substr($hash, 0, 8),
        substr($hash, 8, 4),
        (hexdec(substr($hash, 12, 4)) & 0x0fff) | 0x5000,
        (hexdec(substr($hash, 16, 4)) & 0x3fff) | 0x8000,
        substr($hash, 20, 12)
    );
}

# 시간순 정렬 가능 DESC, ASC
public function v7(string|int $prekey=null): string
{
    $timestamp = ($prekey) ? time() + $prekey : floor(microtime(true) * 1000);

    # Random bits (74 bits)
    $randA = random_bytes(5);
    $randB = random_bytes(5);

    # imestamp hex (12 chars)
    $time_hex = str_pad(dechex($timestamp), 12, '0', STR_PAD_LEFT);

    # variant bits
    return sprintf('%s-%s-%s-%s-%s',
        $time_hex,
        bin2hex(substr($randA, 0, 2)),
        '7' . bin2hex(substr($randA, 2, 1)),
        '8' . bin2hex(substr($randA, 3, 1)),
```

```
            bin2hex($randB)
        );
    }

    #@ String
    public function is_valid(string $uuid) : mixed {
        return preg_match('/^\{?[0-9a-f]{8}\-?[0-9a-f]{4}\-?[0-9a-f]{4}\-?'.'[0-9a-f]{4}\-?[0-9a-f]{12}\}?$/i', $uuid) === 1;
    }
}
```

--- 파일 경로: composer.json ---

```
{
    "name": "apmsoft/flexphp-banana",
    "description": "PHP",
    "type": "library",
    "license": "MIT",
    "homepage": "http://flexphp.fancyupsoft.com",
    "authors": [
        {
            "name": "Kim JongKwan",
            "email": "apmsoft@gmail.com",
            "homepage": "http://flexphp.fancyupsoft.com",
            "role": "Developer"
        }
    ],
    "require": {
        "php": ">=8.1"
    },
    "autoload": {
        "psr-4": {
            "Flex\\Banana\\Classes\\": "classes",
            "Flex\\Banana\\Adapters\\": "adapters",
            "Flex\\Banana\\Interfaces\\": "interfaces",
            "Flex\\Banana\\Traits\\": "traits",
            "Flex\\Banana\\Utils\\": "utils",
            "Flex\\Banana\\Task\\": "task"
        }
    }
}
```

--- 파일 경로: interfaces/BaseAdapterInterface.php ---

```
<?php
namespace Flex\Banana\Interfaces;

interface BaseAdapterInterface
{
    public function getVersion(): string;
}
```

--- 파일 경로: interfaces/DeleteInterface.php ---

```
<?php
namespace Flex\Banana\Interfaces;

interface DeleteInterface{
    public function doDelete(?array $params=[]) : ?string;
}
```

--- 파일 경로: interfaces/DoInterface.php ---

```php
<?php
namespace Flex\Banana\Interfaces;

interface DoInterface{
    public function do(?array $params=[]) : ?string;
}
```

--- 파일 경로: interfaces/EditInterface.php ---

```php
<?php
namespace Flex\Banana\Interfaces;

interface EditInterface{
    public function doEdit(?array $params=[]) : ?string;
}
```

--- 파일 경로: interfaces/EditUpdateInterface.php ---

```php
<?php
namespace Flex\Banana\Interfaces;

use Flex\Banana\Interfaces\EditInterface;
use Flex\Banana\Interfaces\UpdateInterface;

interface EditUpdateInterface extends EditInterface, UpdateInterface {}
```

--- 파일 경로: interfaces/EnumInterface.php ---

```php
<?php
namespace Flex\Banana\Interfaces;

interface EnumInterface
{
    public function filter(mixed $data = null, ...$params): mixed;
    public function format(mixed $data = null, ...$params): mixed;
    public function validate(mixed $data = null, ...$params): void;
}
```

--- 파일 경로: interfaces/EnumValueInterface.php ---

```php
<?php
namespace Flex\Banana\Interfaces;

interface EnumValueInterface
{
    public static function byName(string $name, string $case = 'UPPER'): ?object;
    public function setValue(string $key, $value): void;
    public function getValue(string $key);
}
```

--- 파일 경로: interfaces/ImageCompressorInterface.php ---

```php
<?php
namespace Flex\Banana\Interfaces;
use Flex\Banana\Classes\Image\ImageGDS;
```

```
interface ImageCompressorInterface
{
    public function getImageGDS(): ImageGDS;
}
```

--- 파일 경로: interfaces/InsertInterface.php ---

```
<?php
namespace Flex\Banana\Interfaces;

interface InsertInterface{
    public function doInsert(?array $params=[]) : ?string;
}
```

--- 파일 경로: interfaces/ListInterface.php ---

```
<?php
namespace Flex\Banana\Interfaces;

interface ListInterface{
    public function doList(?array $params=[]) : ?string;
}
```

--- 파일 경로: interfaces/PostInsertInterface.php ---

```
<?php
namespace Flex\Banana\Interfaces;

use Flex\Banana\Interfaces\PostInterface;
use Flex\Banana\Interfaces\InsertInterface;

interface PostInsertInterface extends PostInterface, InsertInterface{
}
```

--- 파일 경로: interfaces/PostInterface.php ---

```
<?php
namespace Flex\Banana\Interfaces;

interface PostInterface{
    public function doPost(?array $params=[]) : ?string;
}
```

--- 파일 경로: interfaces/ReplInterface.php ---

```
<?php
namespace Flex\Banana\Interfaces;

interface ReplInterface{
    public function doRepl(?array $params=[]) : ?string;
}
```

--- 파일 경로: interfaces/ReplyInterface.php ---

```php
<?php
namespace Flex\Banana\Interfaces;

interface ReplyInterface{
    public function doReply(?array $params=[]) : ?string;
}
```

--- 파일 경로: interfaces/ReplyReplInterface.php ---

```php
<?php
namespace Flex\Banana\Interfaces;

use Flex\Banana\Interfaces\ReplyInterface;
use Flex\Banana\Interfaces\ReplInterface;

interface ReplyReplInterface extends ReplyInterface,ReplInterface{}
```

--- 파일 경로: interfaces/RouteInterface.php ---

```php
<?php
namespace Flex\Banana\Interfaces;

interface RouteInterface {
    public function getRoutes(): array;
}
```

--- 파일 경로: interfaces/ShardingStrategyInterface.php ---

```php
<?php
namespace Flex\Banana\Interfaces;

interface ShardingStrategyInterface {
  public function addServer(string $group, string $server, int $weight = 1): void;
  public function removeServer(string $group, string $server): void;
  public function getServer(string $group, string $key): ?string;
}
```

--- 파일 경로: interfaces/UpdateInterface.php ---

```php
<?php
namespace Flex\Banana\Interfaces;

interface UpdateInterface{
    public function doUpdate(?array $params=[]) : ?string;
}
```

--- 파일 경로: interfaces/ViewInterface.php ---

```php
<?php
namespace Flex\Banana\Interfaces;

interface ViewInterface{
    public function doView(?array $params=[]) : ?string;
```

```
}
```

--- 파일 경로: res/sysmsg.json ---

```
{
   "e_null": "을(를) 입력 하세요",
   "e_spaces": "공백없이 입력 하세요",
   "e_enum": "에 해당하는 값을 찾을 수 없습니다.",
   "e_ctype_alnum": "영문 또는 숫자만 입력하세요",
   "e_same_repeat_string" : "연속된 문자를 %s자 이상 입력할 수 없습니다.",
   "e_number": "숫자만 입력하세요",
   "e_korean": "한글을 입력할 수 없습니다",
   "e_string_length": "길이는 %d~%d자를 입력하세요",
   "e_etc_string": "허용된 특수문자%s 외에는 입력할 수 없습니다",
   "e_chk_etc_string": "특수문자를 최소 1개 이상 입력하세요",
   "e_alphabet": "영어(alphabet)을 입력 하세요",
   "e_date": "날짜를 정확하게 입력 하세요",
   "e_time": "시간을 정확하게 입력 하세요",
   "e_date_period": "날짜 기간을 정확하게 입력 하세요",
   "e_equals": "일치하지 않습니다.",
   "e_up_alphabet": "대문자로 입력 하세요",
   "e_low_alphabet": "소문자로 입력 하세요",
   "e_first_alphabet":"첫 글자는 영문으로만 입력 하세요",
   "e_json":"데이터를 JSON 형태로 입력 하세요",
   "e_float": "숫자와 소수형 숫자만 입력하세요",
   "e_link_url": "URL 주소 정확하게 입력 하세요"
}
```

--- 파일 경로: res/sysmsg_en.json ---

```
{
   "e_null": "Please enter a value",
   "e_spaces": "Please enter without spaces",
   "e_enum": "Cannot find a value corresponding to this",
   "e_ctype_alnum": "Please enter only letters or numbers",
   "e_same_repeat_string": "You cannot enter more than %s consecutive characters",
   "e_number": "Please enter numbers only",
   "e_korean": "Korean characters cannot be entered",
   "e_string_length": "Please enter a length between %d and %d characters",
   "e_etc_string": "You cannot enter special characters other than the allowed ones%s",
   "e_chk_etc_string": "Please enter at least one special character",
   "e_alphabet": "Please enter English alphabet",
   "e_date": "Please enter the date correctly",
   "e_time": "Please enter the time correctly",
   "e_date_period": "Please enter the date period correctly",
   "e_equals": "Does not match",
   "e_up_alphabet": "Please enter in uppercase",
   "e_low_alphabet": "Please enter in lowercase",
   "e_first_alphabet": "The first character must be an English letter",
   "e_json": "Please enter the data in JSON format",
   "e_float": "Please enter only numbers and decimal numbers",
   "e_link_url": "Please enter the URL address correctly"
}
```

--- 파일 경로: res/sysmsg_jp.json ---

```
{
   "e_null": "値を入力してください",
   "e_spaces": "スペースなしで入力してください",
   "e_enum": "該当する値が見つかりません",
   "e_ctype_alnum": "文字または数字のみを入力してください",
   "e_same_repeat_string": "%s文字以上の連続した文字は入力できません",
   "e_number": "数字のみを入力してください",
   "e_korean": "韓国語の文字は入力できません",
   "e_string_length": "%dから%d文字の長さで入力してください",
```

```
    "e_etc_string": "許可された特殊文字%s以外は入力できません",
    "e_chk_etc_string": "少なくとも1つの特殊文字を入力してください",
    "e_alphabet": "英語のアルファベットを入力してください",
    "e_date": "日付を正しく入力してください",
    "e_time": "時間を正しく入力してください",
    "e_date_period": "日付期間を正しく入力してください",
    "e_equals": "一致しません",
    "e_up_alphabet": "大文字で入力してください",
    "e_low_alphabet": "小文字で入力してください",
    "e_first_alphabet": "最初の文字は英語の文字でなければなりません",
    "e_json": "データをJSON形式で入力してください",
    "e_float": "数字と小数点の数字のみを入力してください",
    "e_link_url": "URLアドレスを正しく入力してください"
}
```

--- 파일 경로: res/sysmsg_ko.json ---

```
{
    "e_null": "을(를) 입력 하세요",
    "e_spaces": "공백없이 입력 하세요",
    "e_enum": "에 해당하는 값을 찾을 수 없습니다.",
    "e_ctype_alnum": "영문 또는 숫자만 입력하세요",
    "e_same_repeat_string" : "연속된 문자를 %s자 이상 입력할 수 없습니다.",
    "e_number": "숫자만 입력하세요",
    "e_korean": "한글을 입력할 수 없습니다",
    "e_string_length": "길이는 %d~%d자를 입력하세요",
    "e_etc_string": "허용된 특수문자%s 외에는 입력할 수 없습니다",
    "e_chk_etc_string": "특수문자를 최소 1개 이상 입력하세요",
    "e_alphabet": "영어(alphabet)을 입력 하세요",
    "e_date": "날짜를 정확하게 입력 하세요",
    "e_time": "시간을 정확하게 입력 하세요",
    "e_date_period": "날짜 기간을 정확하게 입력 하세요",
    "e_equals": "일치하지 않습니다.",
    "e_up_alphabet": "대문자로 입력 하세요",
    "e_low_alphabet": "소문자로 입력 하세요",
    "e_first_alphabet":"첫 글자는 영문으로만 입력 하세요",
    "e_json":"데이터를 JSON 형태로 입력 하세요",
    "e_float": "숫자와 소수형 숫자만 입력하세요",
    "e_link_url": "URL 주소 정확하게 입력 하세요"
}
```

--- 파일 경로: res/sysmsg_zh.json ---

```
{
    "e_null": "请输入一个值",
    "e_spaces": "请输入时不要包含空格",
    "e_enum": "找不到与此对应的值",
    "e_ctype_alnum": "请只输入字母或数字",
    "e_same_repeat_string": "不能输入超过%s个连续的相同字符",
    "e_number": "请只输入数字",
    "e_korean": "不能输入韩文字符",
    "e_string_length": "请输入长度在%d到%d个字符之间",
    "e_etc_string": "不能输入除允许的特殊字符%s以外的特殊字符",
    "e_chk_etc_string": "请至少输入一个特殊字符",
    "e_alphabet": "请输入英文字母",
    "e_date": "请正确输入日期",
    "e_time": "请正确输入时间",
    "e_date_period": "请正确输入日期期间",
    "e_equals": "不匹配",
    "e_up_alphabet": "请输入大写字母",
    "e_low_alphabet": "请输入小写字母",
    "e_first_alphabet": "第一个字符必须是英文字母",
    "e_json": "请以JSON格式输入数据",
    "e_float": "请只输入数字和小数",
    "e_link_url": "请正确输入URL地址"
}
```

--- 파일 경로: task/EnumImportBasicTask.php ---

```php
<?php
namespace Flex\Banana\Task;

use Flex\Banana\Classes\Log;

class EnumImportBasicTask
{
  public const __version = '0.2.0';
  private array $enumClassNames;

  public function __construct(array $enumClassNames)
  {
    $this->enumClassNames = $enumClassNames;
  }

  public function execute(): array
  {
    $result = [];
    // Log::d('** enumClassNames **',$this->enumClassNames);

    foreach ($this->enumClassNames as $enum) {
      Log::d('>> raw enum input', $enum);

      if (!is_string($enum)) {
        Log::w("Skipped non-string enum: " . json_encode($enum));
        continue;
      }

      if (empty($enum)) {
        Log::w("Skipped empty enum after unescape.");
        continue;
      }

      if (!class_exists($enum)) {
        Log::e("Enum class not found: " . $enum);
        continue;
      }

      $ref = new \ReflectionClass($enum);
      if ($ref->isEnum()) {
        $cases = $enum::cases();
        $short = $ref->getShortName();
        $result[$short] = $cases[0] ?? null;
      }
    }

    // Log::d('** enumClassNames :: result **',$result);

    return $result;
  }
}
```

--- 파일 경로: task/ExceptionBasicTask.php ---

```php
<?php
namespace Flex\Banana\Task;

use Flex\Banana\Classes\Json\JsonEncoder;
use Flex\Banana\Classes\Log;

class ExceptionBasicTask
{
    public const __version = '0.1.0';

    public function __construct(
    ){}

    public function execute(string|array $message = '예외가 발생했습니다.'): void
    {
        if (is_array($message)) {
            $message = JsonEncoder::toJson($message);
```

```
        }
        Log::e("[ExceptionBasicTask]", $message);
        throw new \Exception($message);
    }
}
```

--- 파일 경로: task/HttpRequestTask.php ---

```
<?php
namespace Flex\Banana\Task;

use Flex\Banana\Classes\Http\HttpRequest;
use Flex\Banana\Classes\Log;

class HttpRequestTask
{
    public const __version = '0.1.0';

    public function __construct(
    ) {}

    public function execute(string $method, array $set): mixed
    {
        try{
            $request = new HttpRequest();

            if (empty($set['url'])) {
                throw new \Exception("HttpRequestTask::execute - empty or invalid URL");
            }

            if(!is_string($set['params'])){
                throw new \Exception("HttpRequestTask::execute - 'params' must be string, got " . gettype($set['params']));
            }

            $headers = is_array($set['headers'] ?? null) ? $set['headers'] : [];
            $request->set($set['url'], $set['params'] ?? '', $headers);
            $responses = match(strtoupper($method)){
                "POST"   => $request->post(),
                "GET"    => $request->get(),
                "PUT"    => $request->put(),
                "PATCH"  => $request->patch(),
                "DELETE" => $request->delete(),
                default  => throw new \Exception("HttpRequestTask::execute - Unsupported method: {$method}")
            };

            return $responses;
        }catch(\Exception $e){
            Log::e("HttpRequestTask::execute error", [
                'message' => $e->getMessage(),
                'set' => $set,
                'method' => $method
            ]);
            throw new \Exception("HttpRequestTask::execute failed: " . $e->getMessage());
        }
    }
}
```

--- 파일 경로: task/PagingRelationBasicTask.php ---

```
<?php
namespace Flex\Banana\Task;

use Flex\Banana\Classes\Paging\Relation;
use Flex\Banana\Classes\Log;

class PagingRelationBasicTask
{
    public const __version = '0.2.2';

    public function __construct(
```

```
        private int $total_record,
        private int $page
    ){}

    public function execute(int $page_count=10, int $block_limit=5) : array
    {
        $paging   = new Relation( $this->total_record ?? 0, $this->page ?? 1 );
        $relation = $paging->query( $page_count, $block_limit )->build()->paging();

        return [
            "page"          => $paging->page,
            "totalPage"     => $paging->totalPage,
            "qLimitStart"   => $paging->qLimitStart,
            "qLimitEnd"     => $paging->qLimitEnd,
            "totalRecord"   => $paging->totalRecord,
            "blockStartPage" => $paging->blockStartPage,
            "blockEndPage"  => $paging->blockEndPage,
            "relation"      => $relation
        ];
    }
}
```

--- 파일 경로: task/QueryDeleteBasicTask.php ---

```
<?php
namespace Flex\Banana\Task;

use Flex\Banana\Classes\Db\DbManager;
use Flex\Banana\Classes\Log;

class QueryDeleteBasicTask
{
    public const __version = '0.2.0';

    public function __construct(
        private DbManager $db,
        private string $table
    ){}

    private function _where(string|array $where): string|null {
        if (empty($where)) return null;

        if (is_string($where)) {
            return $where;
        }

        if (is_array($where)) {
            return $this->db->buildWhere($where);
        }

        return null;
    }

    public function execute(string | array $where) : void
    {
        $_where = $this->_where($where['where'] ?? '');
        if($_where)
        {
            try{
                    if ($this->db->inTransaction()) {
                        $this->db->rollBack();
                    }
                    $data = $this->db->table($this->table)->where($_where)->query()->fetch_assoc();
                    if($data){
                            if ($this->db->inTransaction()) {
                                $this->db->rollBack();
                            }
                            $this->db->beginTransaction();
                            $this->db->table($this->table)->where($_where)->delete();
                            $this->db->commit();
                    }
            }catch(\Exception $e){
                Log::e($e->getMessage());
                // throw new \Exception($e->getMessage());
```

```
            }
        }
    }
}
```

--- 파일 경로: task/QueryInsertBasicTask.php ---

```
<?php
namespace Flex\Banana\Task;

use Flex\Banana\Utils\Requested;
use Flex\Banana\Classes\Db\DbManager;
use Flex\Banana\Traits\FidTrait;
use Flex\Banana\Classes\Log;

class QueryInsertBasicTask
{
    public const __version = '0.3.0';
    use FidTrait;

    public function __construct(
        private DbManager $db,
        private string $table,
        private array $preset
    ) {}

    #@ Fid
    public function getTable(): string
    {
        return $this->table;
    }

    #@ Fid
    public function getFidColumnName(): string
    {
        return "fid";
    }

    public function execute(array $requested): void
    {
        try {
            if ($this->db->inTransaction()) {
                $this->db->rollBack();
        }
        $this->db->beginTransaction();

            foreach ($this->preset as $item) {
                if (!is_array($item) || count($item) === 0) {
                    continue;
                }

                $enum = $item[0];
                $options = array_slice($item, 1);

                // 필요한 경우 클래스 문자열을 ENUM 인스턴스로 변환
                if (is_string($enum) && enum_exists($enum)) {
                    $cases = $enum::cases();
                    $enum = $cases[0] ?? null;
                }

                if (!($enum instanceof \BackedEnum)) {
                    continue;
                }

                $columnName = $enum->value;
                if ($columnName == $this->getFidColumnName()) {
                    $this->db[$columnName] = $this->createParentFid();
                } else {
                    $this->db[$columnName] = $enum->filter($requested[$columnName] ?? '', ...$options);
                }
            }

            $this->db->table($this->table)->insert();
            $this->db->commit();
```

```
        } catch (\Exception $e) {
            throw new \Exception($e->getMessage());
        }
    }
}
```

--- 파일 경로: task/QueryReplyBasicTask.php ---

```
<?php
namespace Flex\Banana\Task;

use Flex\Banana\Utils\Requested;
use Flex\Banana\Classes\Db\DbManager;
use Flex\Banana\Traits\FidTrait;
use Flex\Banana\Classes\Log;

class QueryReplyBasicTask
{
    public const __version = '0.1.0';
    use FidTrait;

    public function __construct(
        private DbManager $db,
        private string $table,
        private array $preset
    ) {}

    #@ Fid
    public function getTable(): string
    {
        return $this->table;
    }

    #@ Fid
    public function getFidColumnName(): string
    {
        return "fid";
    }

    private function _where(string|array $where): string|null {
        if (empty($where)) return null;

        if (is_string($where)) {
            return $where;
        }

        if (is_array($where)) {
            return $this->db->buildWhere($where);
        }

        return null;
    }

    public function execute(string|array $where, array $requested): void
    {
        # 부모글이 있는지 체크하기
        $_where = $this->_where($where['where'] ?? '');
        if($_where)
        {
            $data = $this->db->table($this->table)->where($_where)->query()->fetch_assoc();
            if($data){
                try {
                            if ($this->db->inTransaction()) {
                                $this->db->rollBack();
                            }
                            $this->db->beginTransaction();

                            foreach ($this->preset as $item) {
                                if (!is_array($item) || count($item) === 0) {
                                    continue;
                                }

                                $enum = $item[0];
                                $options = array_slice($item, 1);
```

```
                                // 필요한 경우 클래스 문자열을 ENUM 인스턴스로 변환
                                if (is_string($enum) && enum_exists($enum)) {
                                    $cases = $enum::cases();
                                    $enum = $cases[0] ?? null;
                                }

                                if (!($enum instanceof \BackedEnum)) {
                                    continue;
                                }

                                $columnName = $enum->value;
                                if ($columnName == $this->getFidColumnName()) {
                                    $this->db[$columnName] = $this->createChildFid($data[$columnName]);
                                } else {
                                    $this->db[$columnName] = $enum->filter($requested[$columnName] ?? '', ...$options);
                                }
                            }

                            $this->db->table($this->table)->insert();
                            $this->db->commit();
                        } catch (\Exception $e) {
                            throw new \Exception($e->getMessage());
                        }
                    }
                }
            }
        }
```

--- 파일 경로: task/QuerySelectBasicTask.php ---

```
<?php
namespace Flex\Banana\Task;

use Flex\Banana\Classes\Db\DbManager;
use Flex\Banana\Traits\FidTrait;
use Flex\Banana\Classes\Log;

class QuerySelectBasicTask
{
    public const __version = '0.2.1';

    use FidTrait;

    public function __construct(
        private DbManager $db,
        private string $table,
        private array $preset
    ){
        # query start
        $this->db->table($this->table)->select(
            $this->findSelectColumns()
        );
    }

    #@ Fid
    public function getTable(): string {
        return $this->table;
    }

    #@ Fid
    public function getFidColumnName(): string {
        return "fid";
    }

    #@ Select Columns String 목록 만들기
    private function findSelectColumns(): string
    {
        $columns = [];
        foreach ($this->preset as $item)
        {
            if (!is_array($item) || count($item) === 0) {
                continue;
            }
            $enum = $item[0];
```

```
        // 필요한 경우 클래스 문자열을 ENUM 인스턴스로 변환
        if (is_string($enum) && enum_exists($enum)) {
            $enum = $enum::cases()[0];
        }

        if (!($enum instanceof \BackedEnum)) {
            continue;
        }

        $columns[] = $enum->value;
    }

    return implode(",", $columns);
}

private function matchs(string $query, mixed $qitem) : void
{
    match($query) {
        "where"   => $this->_where($qitem ?? ''),
        "orderBy" => $this->_orderBy($qitem ?? ''),
        "limit"   => $this->_limit($qitem ?? ''),
        default   => throw new \Exception("Not Found {$query}")
    };
}

private function _where(string | array $where) : void {
    if (!empty($where))
    {
        if(is_string($where)){
            $this->db->where($where);
        }
        else if(is_array($where)){
            $this->db->where(...$where);
        }
    }
}

private function _orderBy(string | array $orderby) : void {
    if (!empty($orderby))
    {
        if(is_string($orderby)){
            $this->db->orderBy($orderby);
        }
        else if(is_array($orderby)){
            $this->db->orderBy(...$orderby);
        }
    }
}

private function _limit(int|array $limit): void {
    if (is_int($limit)) {
        $this->db->limit($limit);
    } elseif (is_array($limit)) {
        $this->db->limit(...$limit);
    }
}

/**
"params": [{
    "where" : "_id="1" | ["_id","asfdsd"] | ["age",">=","100"] | [["_id","1"],["age",">=",100]],
    "orderBy" : "regidate DESC" | ["regidate DESC"] | ["regi_date DESC", "fid ASC"],
    "limit": 10 | [0,10]
}]
*/
public function execute(array $queries) : array
{
    try {
        $queryString = '';
        foreach($queries as $query => $qitem){
            $this->matchs($query, $qitem);
        }

        $queryString = $this->db->query;
        Log::d('queryString',$queryString);
        $result = $this->db->query( $queryString );

        $data = [];
        while ($row = $result->fetch_assoc())
        {
```

```
                    $formattedRow = [];
                    foreach ($this->preset as $item)
                    {
                        if (!is_array($item) || count($item) === 0) {
                            continue;
                        }

                        $enum = $item[0];
                        $options = array_slice($item, 1);

                        // 필요한 경우 클래스 문자열을 ENUM 인스턴스로 변환
                        if (is_string($enum) && enum_exists($enum)) {
                            $enum = $enum::cases()[0];
                        }

                        if (!($enum instanceof \BackedEnum)) {
                            continue;
                        }

                        $columnName = $enum->value;
                        if ($columnName == $this->getFidColumnName()) {
                            $formattedRow[$columnName] = $enum->format($row[$columnName] ?? '', ...$options);
                            $formattedRow["depth"]     = $this->getDepthCount($row[$columnName]);
                        }else{
                            $formattedRow[$columnName] = $enum->format($row[$columnName] ?? '', ...$options);
                        }
                    }
                    $data[] = $formattedRow;
                }

                return $data;
            } catch (\Exception $e) {
                throw new \Exception($e->getMessage());
            }
        }
    }
```

--- 파일 경로: task/QueryUpdateBasicTask.php ---

```
<?php
namespace Flex\Banana\Task;

use Flex\Banana\Utils\Requested;
use Flex\Banana\Classes\Db\DbManager;

class QueryUpdateBasicTask
{
    public const __version = '0.3.0';

    public function __construct(
        private DbManager $db,
        private string $table,
        private array $preset
    ){}

    private function _where(string | array $where) : void {
        if (!empty($where))
        {
            if(is_string($where)){
                $this->db->where($where);
            }
            else if(is_array($where)){
                $this->db->where(...$where);
            }
        }
    }

    public function execute(string | array $where, array $requested) : void
    {
        try {
                if ($this->db->inTransaction()) {
                    $this->db->rollBack();
                }
                $this->db->beginTransaction();
```

```
                foreach ($this->preset as $item)
                {
                    if (!is_array($item) || count($item) === 0) {
                        continue;
                    }

                    $enum = $item[0];
                    $options = array_slice($item, 1);

                    // 필요한 경우 클래스 문자열을 ENUM 인스턴스로 변환
                    if (is_string($enum) && enum_exists($enum)) {
                        $enum = $enum::cases()[0];
                    }

                    if (!($enum instanceof \BackedEnum)) {
                        continue;
                    }

                    $columnName = $enum->value;
                    $this->db[$columnName] = $enum->filter($requested[$columnName] ?? '', ...$options);
                }
                $this->db->table($this->table)->where($this->_where($where))->update();
                $this->db->commit();
            } catch (\Exception $e) {
                throw new \Exception($e->getMessage());
            }
        }
    }
```

--- 파일 경로: task/QueryWhereCaseBasicTask.php ---

```
<?php
namespace Flex\Banana\Task;

use Flex\Banana\Classes\Db\WhereHelper;
use Flex\Banana\Classes\Log;

class QueryWhereCaseBasicTask
{
    public const __version = '0.2.0';

    private mixed $where = '';

    public function __construct(
        private WhereHelper $dbWhere
    ){}

    # execute('and', "name","=","나당");
    # execute('and', ["name","=","나다"]);
    # execute('and', ["name","=","나다"], ["age",">=",19]);
    public function execute(string $coord, ...$params) : void
    {
        $conditions = [];

        # 단일 조건: "name", "=", "나당"
        if (count($params) === 3 && !is_array($params[0])) {
            $conditions[] = [$params[0], $params[1], $params[2]];
        } else {
            foreach ($params as $index => $param) {
                if (!is_array($param)) {
                    throw new \InvalidArgumentException(
                        "Parameter at index {$index} must be an array of 3 elements."
                    );
                }
                if (count($param) !== 3) {
                    throw new \InvalidArgumentException(
                        "Each condition array must contain exactly 3 elements: field, operator, value. Problem at index {$index}."
                    );
                }
                $conditions[] = $param;
            }
        }

        # case
```

```
        $coordCase = strtoupper($coord);
        $this->dbWhere->begin($coordCase);

        foreach($conditions as $casewh){
            list($fieldname, $condition, $value) = $casewh;
            Log::d($fieldname,$condition,$value);
            $this->dbWhere->case($fieldname, $condition, $value);
        }

        $this->dbWhere->end();
    }

    public function __get($propertyName) : mixed
    {
        Log::d(__CLASS__, 'propertyName', $propertyName);
        if ($propertyName === 'where') {
            $this->where = $this->dbWhere->__get('where');
            return $this->where;
        }
        return null;
    }
}
```

--- 파일 경로: task/RequestedFetchBasicTask.php ---

```
<?php
namespace Flex\Banana\Task;

use Flex\Banana\Utils\Requested;

class RequestedFetchBasicTask
{
    public const __version = '0.1.0';

    public function __construct(
        private Requested $requested
    ){}

    private function postFetch() : array
    {
        return $this->requested->post()->fetch();
    }

    private function getFetch() : array
    {
        return $this->requested->get()->fetch();
    }

    public function execute(string $method) : array
    {
        $methodCase = strtoupper($method);
        return match($methodCase) {
            "POST" => $this->postFetch(),
            "GET"=> $this->getFetch(),
            default => throw new \InvalidArgumentException("Invalid method: {$method}"),
        };
    }
}
```

--- 파일 경로: task/SortByFidBasicTask.php ---

```
<?php
namespace Flex\Banana\Task;

use Flex\Banana\Utils\Requested;
use Flex\Banana\Classes\Db\DbManager;
use Flex\Banana\Traits\FidTrait;
use Flex\Banana\Classes\Log;

class SortByFidBasicTask
```

```
{
    public const __version = '0.1.0';
    use FidTrait;

    public function __construct(
        private DbManager $db,
        private string $table
    ) {}

    #@ Fid
    public function getTable(): string
    {
        return $this->table;
    }

    #@ Fid
    public function getFidColumnName(): string
    {
        return "fid";
    }

    public function execute(string $mode, string $fid, string $columnName = '_id'): void
    {
        Log::d($mode, $fid, $columnName);
        if($mode == 'down'){
            # 화살표 위
            $data = $this->getSortDown($fid);
            $this->changeSortFid ($data['cur_fids'], $data['ano_fids'], $columnName);
        }else if($mode == 'up'){
            # 화살표 아래
            $data = $this->getSortUp($fid);
            $this->changeSortFid ($data['cur_fids'], $data['ano_fids'], $columnName);
        }
    }
}
```

--- 파일 경로: task/TotalRecordBasicTask.php ---

```
<?php
namespace Flex\Banana\Task;

use Flex\Banana\Classes\Db\DbManager;
use Flex\Banana\Classes\Log;

class TotalRecordBasicTask
{
    public const __version = '0.1.0';

    public function __construct(
        private DbManager $db
    ){}

    public function execute(string $table, string $where) : int
    {
        return $this->db->table( $table )->where($where)->total();
    }
}
```

--- 파일 경로: task/ValidationBasicTask.php ---

```
<?php
namespace Flex\Banana\Task;

use Flex\Banana\Classes\Log;

class ValidationBasicTask
{
    public const __version = '0.2.1';

    public function __construct(
```

```
        private array $enums
    ){
        // Log::d("** ValidationBasicTask enums", $this->enums);
    }

    public function execute(array $requested) : void
    {
        try {
            foreach ($this->enums as $item) {
                if (!is_array($item) || count($item) === 0) {
                    continue;
                }

                $enum = $item[0];
                $options = array_slice($item, 1);

                // 필요한 경우 클래스 문자열을 ENUM 인스턴스로 변환
                if (is_string($enum) && enum_exists($enum)) {
                    $enum = $enum::cases()[0];
                }

                if (!($enum instanceof \BackedEnum)) {
                    continue;
                }

                $key = $enum->value;
                $enum->validate($requested[$key] ?? '', ...$options);
            }
        } catch (\Exception $e) {
                throw new \Exception($e->getMessage());
        }
    }
}
```

--- 파일 경로: traits/DelimitedStringTrait.php ---

```
<?php
namespace Flex\Banana\Traits;

trait DelimitedStringTrait
{
    public function parseDelimited ( string $separator, string $value, array $default=[]) : ?array
    {
        $result = ($value) ?
                ((strpos($value, $separator) !==false) ? explode($separator, $value) : [$value]) :
                $default;
        return $result;
    }
}
```

--- 파일 경로: traits/EditjsFilterMessageTrait.php ---

```
<?php
namespace Flex\Banana\Traits;

use Flex\Banana\Classes\Html\XssChars;
use Flex\Banana\Classes\Text\TextUtil;

# javascript editjs 텍스트 내용만 찾아 특수문자 제거한 한줄 문장으로 만들기
trait EditjsFilterMessageTrait
{
    const TEXT_LIKE_TYPES = ["paragraph", "header", "quote", "image", "list", "code"];
    const MEDIA_LIKE_TYPES = ['embed', 'linkTool', 'attaches', 'table'];
    const MEDIA_TYPES_TEXT = ['embed' => "미디어", 'linkTool' => "웹 링크", 'attaches'=>"파일 첨부", 'table' => "표"];

    /**
     * Undocumented function
     *
     * @param array $descriptions
     * @param integer $length
```

```
     * @param array $allowTags
     * @return string
     */
    public function getText(array $descriptions, array $allowTags=[]) : string
    {
        $text = "";
        if(is_array($descriptions) && isset($descriptions['blocks'])){
            foreach($descriptions['blocks'] as $idx => $content)
            {
                $tempText = "";

                # 미디어 타입
                if(in_array($content['type'], self::MEDIA_LIKE_TYPES)){
                    $tempText = strtoupper(self::MEDIA_TYPES_TEXT[$content['type']] ?? "");
                }

                # 텍스트 타입
                else if(in_array($content['type'], self::TEXT_LIKE_TYPES))
                {
                    if($content['type'] === "image") {
                        $tempText = $content['data']['caption'] ?? "Image";
                    }else if($content['type'] === "list") {
                        if (!empty($content['data']['items']) && is_array($content['data']['items'])) {
                            $tempText = implode(", ", $content['data']['items']);
                        }
                    }else if($content['type'] === "code") {
                        $tempText = $content['data']['code'] ?? "";
                    }else {
                        $tempText = $content['data']['text'] ?? "";
                    }
                }else{
                    continue;
                }

                if(trim($tempText)){
                    $xssChars = new XssChars( $tempText );
                    foreach($allowTags as $tag) {
                        $xssChars->setAllowTags($tag);
                    }
                    $text .= $xssChars->cleanTags()." ";
                }
            }
        }

        return $text;
    }

    public function getTextCut(array $descriptions, int $length, array $allowTags=["<b>","<strong>"]) : string
    {
        $text = "";
        $text = $this->getText($descriptions, $allowTags);

        # 문자 자르기
        if($text && $length > 0) {
            $text = (new TextUtil( $text ))->cut($length)->value;
        }
        return $text;
    }
}
```

--- 파일 경로: traits/EntryArrayTrait.php ---

```
<?php
namespace Flex\Banana\Traits;

trait EntryArrayTrait
{
    public static function names(): array
    {
        return array_column(self::cases(), 'name');
    }

    public static function values(): array
    {
```

```
        return array_column(self::cases(), 'value');
    }

    public static function array(): array
    {
        if (count(self::names()) == count(self::values())) {
            return array_combine(self::names(), self::values());
        } else {
            return [];
        }
    }

    public static function byName(string $name, string $case = 'UPPER'): ?object
    {
        $NAME = ('UPPER' == strtoupper($case)) ? strtoupper($name) :
                (('LOWER' == strtoupper($case)) ? strtolower($name) : $name);

        foreach (self::cases() as $case) {
            if (strtoupper($case->name) === $NAME) {
                return (object)[
                    'name'  => $case->name,
                    'value' => $case->value
                ];
            }
        }

        return null;
    }

    public static function __callStatic(string $name, array $args = []): string
    {
        return (self::byName($name, $args[0] ?? 'UPPER'))->value;
    }
}
```

--- 파일 경로: traits/EnumInstanceTrait.php ---

```
<?php
namespace Flex\Banana\Traits;

use Flex\Banana\Classes\Enum\EnumValueStorage;

trait EnumInstanceTrait
{
    public static function create(): self
    {
        return self::cases()[0];
    }

    public function setValue(string $key, $value): void
    {
        EnumValueStorage::setValue(static::class, $key, $value);
    }

    public function getValue(string $key)
    {
        return EnumValueStorage::getValue(static::class, $key);
    }

    public static function resetValues(): void
    {
        EnumValueStorage::reset(static::class);
    }

    public function getInstanceValues(): array
    {
        return EnumValueStorage::getValues(static::class);
    }
}
```

--- 파일 경로: traits/FidTrait.php ---

```php
<?php
namespace Flex\Banana\Traits;

use Flex\Banana\Classes\Log;

# 스트링 다단 처리
# @ FidProviderInterface : requied
# 이 클래스를 사용하려면 반드시 이 이클래스 사용하는 클래스에서 구현하세요
trait FidTrait
{
    # FidProviderInterface : requied
    abstract protected function getTable(): string;
    abstract protected function getFidColumnName(): string;

    # reple 하부메뉴 및 답글에 사용
    # 다단 fid > "9999999997.01" AND fid < "9999999997.0199";
    public function createChildFid(string $fid) : string
    {
        # 해당 fid 중 가장 큰값 찾기
        // [$this->getFidColumnName(),'>',$fid],[$this->getFidColumnName(),'<',$fid.'99']
        $where = sprintf("%s > '%s' AND %s < '%s'",$this->getFidColumnName(), $fid, $this->getFidColumnName(), $fid.'99');
        $fid_max = $this->db->table($this->getTable())
            ->select(sprintf("max(%s)", $this->getFidColumnName()))
            ->where($where)
            ->query()->fetch_row();

        # depth
        $depth  = (isset($fid_max[0])) ? ((int)substr($fid_max[0],-2) + 1) : 1;

        # result
        return sprintf("%s%02d",$fid, $depth);
    }

    # Insert 에 fid 키 만들기
    public function createParentFid() : string
    {
        # fid min 값 가져오기
        $fid_row = $this->db->table( $this->getTable() )
            ->select(sprintf("min(%s)", $this->getFidColumnName()))->query()->fetch_row();

        # make fid
        $_fid = (isset($fid_row[0])) ? explode('.',$fid_row[0])[0] -1 : '9999999999';
        return sprintf("%s.",$_fid);
    }

    # 현재 뎁스 길이
    public function getDepthCount(string $fid) : int
    {
        # fid
        $fids = (strpos($fid,".") !==false) ? explode('.',$fid)[1] : '';
        return (int) (strlen($fids) / 2);
    }

    # depth 깊이 만큼 가계 뽑아주기
    public function getFidGenealogy(string $fid) : array
    {
        # result
        $result = [];

        # depth
        $depth = $this->getDepthCount($fid);

        # category argv
        $root_pos = strpos($fid,".");
        if($root_pos !==false){
            $start_pos = $root_pos + 1;
            for($i=0; $i<=$depth; $i++){
                $end_pos = $start_pos + ($i*2);
                $result[] = substr($fid, 0, $end_pos);
            }
        }

    return $result;
    }

    # list query
```

```
# FID depth 정렬
# mysql : fid+0 asc | pgsql : fid asc
public function orderBy(?string $columnName=null,?string $asc = 'ASC') : string
{
    return sprintf("%s %s", $columnName ?? $this->getFidColumnName(), $asc);
}

# 화살표 위
public function getSortUp (string $fid) : array
{
    # current fid array
    $cur_fids = [];
    $cur_rlt = $this->db->table($this->getTable())
        ->where( $this->getFidColumnName(), 'LIKE-R', $fid)
        ->orderBy( $this->orderBy() )
        ->query();
    while($cur_row = $cur_rlt->fetch_assoc()){
        $cur_fids[] = $cur_row;
    }

    # < fid array
    $pre_fids = [];
    $depth = $this->getDepthCount($fid);
    $fids = explode('.',$fid);

    $pre_fid = '';
    if($depth < 1){
        $pre_fid = ($fids[0]-1).".";
    }else {
        $end_2str = substr($fid,-2);
        if($end_2str != '01'){
            $end_fid = ((int)$end_2str - 1);
            $pre_fid = sprintf("%s%02d",substr($fid,0,-2),$end_fid);
        }
    }

    if($pre_fid)
    {
        // Log::d('pre_fid ->',$pre_fid);
        $pre_row = $this->db->table($this->getTable())
            ->select($this->getFidColumnName())
            ->where(sprintf("%s >= '%s'",$this->getFidColumnName(), $pre_fid))
            ->limit(1)
            ->orderBy( $this->orderBy() )
            ->query()->fetch_assoc();
        if(isset($pre_row[$this->getFidColumnName()]))
        {
            # pre_fid
            $pre_fid = $pre_row[$this->getFidColumnName()];
            $pre_depth = $this->getDepthCount($pre_fid);
            // Log::d('pre_fid', $pre_fid,'pre_depth',$pre_depth);

            if($depth == $pre_depth)
            {
                # query
                $pre_rlt = $this->db->table($this->getTable())
                    ->select('*')
                    ->where($this->getFidColumnName(), 'LIKE-R', $pre_fid)
                    ->orderBy( $this->orderBy() )
                    ->query();
                while($pre_row = $pre_rlt->fetch_assoc()){
                    $pre_fids[] = $pre_row;
                }
                // Log::d('pre_fids',$pre_fids);
            }
        }
    }

    return [
        'cur_fids' => $cur_fids,
        'ano_fids' => $pre_fids
    ];
}

# 화살표 다운
public function getSortDown (string $fid) : array
{
    # current fid array
    $cur_fids = [];
```

```
    $cur_rlt = $this->db->table($this->getTable())
        ->where($this->getFidColumnName(), 'LIKE-R', $fid)
        ->orderBy( $this->orderBy() )
        ->query();
    while($cur_row = $cur_rlt->fetch_assoc()){
        $cur_fids[] = $cur_row;
    }
    Log::d('cur_fids',$cur_fids);

    # > fid array
    $nxt_fids = [];
    $depth = $this->getDepthCount($fid);
    $fids = explode('.',$fid);
    $nxt_fid = ($depth < 1) ? ($fids[0]+1)."." : sprintf("%s%02d",substr($fid,0,-2),((int)substr($fid,-2) + 1));
    Log::d('nxt_fid ->',$nxt_fid);
    $nxt_row = $this->db->table($this->getTable())
        ->select($this->getFidColumnName())
        ->where(sprintf("%s >= '%s'",$this->getFidColumnName(), $nxt_fid))
        ->limit(1)
        ->orderBy( $this->orderBy() )
        ->query()->fetch_assoc();
    if(isset($nxt_row[$this->getFidColumnName()]))
    {
        # nxt_fid
        $nxt_fid = $nxt_row[$this->getFidColumnName()];
        $nxt_depth = $this->getDepthCount($nxt_fid);
        Log::d('nxt_fid', $nxt_fid,'nxt_depth',$nxt_depth);

        if($depth == $nxt_depth)
        {
            # query
            $nxt_rlt = $this->db->table($this->getTable())
                ->select('*')
                ->where($this->getFidColumnName(), 'LIKE-R', $nxt_fid)
                ->orderBy( $this->orderBy() )
                ->query();
            while($nxt_row = $nxt_rlt->fetch_assoc()){
                $nxt_fids[] = $nxt_row;
            }
            Log::d('nxt_fids',$nxt_fids);
        }
    }

    return [
        'cur_fids' => $cur_fids,
        'ano_fids' => $nxt_fids
    ];
}

# 데이터베이스의 fid 값 변경 하기
public function changeSortFid (array $cur_fids, array $ano_fids, string $using_where_key='_id') : array
{
    $result = [];
    # fid change
    if(count($cur_fids) && count($ano_fids))
    {
        # change cur -> ano
        $ano_root_fid = $ano_fids[0][$this->getFidColumnName()];
        $ano_depth = $this->getDepthCount($ano_root_fid);
        Log::d('ano', $ano_root_fid, $ano_depth);
        $ano_parent_fid = ($ano_depth<1) ? (explode('.',$ano_root_fid))[0]."." : $ano_root_fid;

        # db update
        foreach($cur_fids as $cur_fid)
        {
            $this_fid = $cur_fid[$this->getFidColumnName()];
            $cur_depth = $this->getDepthCount($this_fid);
            $cur_update_fid = ($ano_depth ==$cur_depth) ? $ano_parent_fid: sprintf("%s%s",$ano_parent_fid,substr($this_fid,($cur_depth-$ano_depth)*-2));
            Log::d('cur -> ano', $this_fid,'->',$cur_update_fid);
            $result[] = sprintf("cur => ano : %s -> %s", $this_fid,$cur_update_fid);
            try{
                $where = sprintf("%s='%s'",$using_where_key,$cur_fid[$using_where_key]);
                $this->db->beginTransaction();
                $this->db[$this->getFidColumnName()] = $cur_update_fid;
                $this->db->table($this->getTable())->where($where)->update();
                $this->db->commit();
            }catch(\Exception $e){
                $this->db->rollBack();
                Log::e($e->getMessage());
```

```
                }
            }

            # change ano -> cur
            $cur_root_fid = $cur_fids[0][$this->getFidColumnName()];
            $cur_depth = $this->getDepthCount($cur_root_fid);
            Log::d('cur', $cur_root_fid, $cur_depth);
            $cur_parent_fid = ($cur_depth<1) ? (explode('.',$cur_root_fid))[0]."." : $cur_root_fid;

            # db update
            foreach($ano_fids as $ano_fid)
            {
                $this_fid = $ano_fid[$this->getFidColumnName()];
                $ano_depth = $this->getDepthCount($this_fid);
                $ano_update_fid = ($cur_depth ==$ano_depth) ? $cur_parent_fid: sprintf("%s%s",$cur_parent_fid,substr($this_fid,($ano_depth-$cur_depth)*-2));
                Log::d('ano -> cur', $this_fid,'->',$ano_update_fid);
                $result[] = sprintf("ano => cur : %s -> %s", $this_fid,$ano_update_fid);
                try{
                    $this->db->beginTransaction();
                    $this->db[$this->getFidColumnName()] = $ano_update_fid;
                    $this->db->table($this->getTable())->where(sprintf("%s='%s'",$using_where_key,$ano_fid[$using_where_key]))->update();
                    $this->db->commit();
                }catch(\Exception $e){
                    $this->db->rollBack();
                    Log::e($e->getMessage());
                }
            }
        }

        return $result;
    }
}
```

--- 파일 경로: traits/ImageComporessorEditjsTrait.php ---

```
<?php
namespace Flex\Banana\Traits;

# javascript editjs 이미지 내용 찾아 압축하기
# @ FidProviderInterface : requied
# @ ImageCompressorBase64Trait : requied
trait ImageComporessorEditjsTrait
{
    public function compressDescriptionBase64Image(array $descriptions, int $width, int $height) : array
    {
        if(is_array($descriptions) && isset($descriptions['blocks'])){
            foreach($descriptions['blocks'] as $idx => $content)
            {
                if($content['type'] == 'image')
                {
                    $base64_image = $content['data']['url'];
                    $resize_base64_image = $this->resizeBase64Image($base64_image, $width, $height);
                    $descriptions['blocks'][$idx]['data']['url'] = $resize_base64_image;
                }
            }
        }

        return $descriptions;
    }

    # @ ImageCompressorBase64Trait : requied
    abstract protected function resizeBase64Image(string $base64_image, int $width, int $height) : string;
}
```

--- 파일 경로: traits/ImageCompressorBase64Trait.php ---

```
<?php
namespace Flex\Banana\Traits;

use Flex\Banana\Classes\Log;
```

```
# Base64 Iamge 리사이즈
# @ ImageCompressorProviderInterface : requied
# 이 클래스를 사용하려면 반드시 이 이클래스 사용하는 클래스에서 구현하세요
trait ImageCompressorBase64Trait
{
    public function resizeBase64Image(string $base64_image, int $width, int $height) : string
    {
        $result = '';
        try{
            # ImageGDS class
            $imageGDS = $this->getImageGDS();
            $result = $imageGDS->resizeBase64Image($base64_image, $width, $height);
        }catch(\Exception $e){
            Log::e($e->getMessage());
        }

        return $result;
    }

    #@ ImageCompressorProviderInterface : requied
    abstract protected function getImageGDS();
}
```

--- 파일 경로: traits/NullableValidationTrait.php ---

```
<?php
namespace Flex\Banana\Traits;

use Flex\Banana\Classes\Request\FormValidation as Validation;

trait NullableValidationTrait
{
    /**
     * 공통 optional 유효성 검사 메서드
     *
     * @param string $column_name   컬럼 이름 (예: DB 컬럼명)
     * @param string $column_title  컬럼 제목 (예: 사용자 노출용 이름)
     * @param mixed $data           검증할 데이터
     * @param mixed ...$params      추가 파라미터 ('optional' 또는 '?' 등)
     *
     * @return Validation
     */
    public function checkNullOptional(string $column_name, string $column_title, mixed $data, string $optional): Validation
    {
        $validation = new Validation($column_name, $column_title, $data);

        if (!in_array($optional ?? null, ['optional', '?'], true)) {
            $validation->null();
        }

        return $validation;
    }
}
```

--- 파일 경로: traits/PasswordHashTrait.php ---

```
<?php
namespace Flex\Banana\Traits;

use Flex\Banana\Classes\Cipher\CipherGeneric;
use Flex\Banana\Classes\Cipher\PasswordHash;

trait PasswordHashTrait
{
    public function hashPassword(string $value): string
    {
        $passwordCipher = new CipherGeneric(new PasswordHash());
        return $passwordCipher->hash($value);
    }
}
```

--- 파일 경로: traits/TimeZoneTrait.php ---

```php
<?php
namespace Flex\Banana\Traits;

use Flex\Banana\Classes\Array\ArrayHelper;
use Flex\Banana\Classes\Date\DateTimez;
use \DateTimeZone;

# 날짜 관련 데이터베이스 저장 및 뷰
trait TimeZoneTrait
{
    public function nowInTZ(string $utcgmttime): string
    {
        return (new DateTimez("now", $utcgmttime))->format('Y-m-d H:i:s P');
    }

    public function toTZFormat(string $datetimeptz,  string $utcgmttime, string $convert_utcgmttime, array $timezone_formats) : ?string
    {
        if(!$datetimeptz){
            return null;
        }

        $dataTimeZ = (new DateTimez($datetimeptz, $utcgmttime));
        $dataTimeZ->setTimezone(new DateTimeZone($convert_utcgmttime));
        return $dataTimeZ->format(
            ((new ArrayHelper( $timezone_formats ))->find("timezone",$convert_utcgmttime)->value)['format']
        );
    }
}
```

--- 파일 경로: traits/UniqueIdTrait.php ---

```php
<?php
namespace Flex\Banana\Traits;

use Flex\Banana\Classes\Uuid\UuidGenerator;

# 각종 토큰 및 id 생성
trait UniqueIdTrait
{
    public function genId(): string
    {
        $uuid = (new UuidGenerator())->v7();
        return $uuid;
    }
}
```

--- 파일 경로: utils/Requested.php ---

```php
<?php
namespace Flex\Banana\Utils;

use Psr\Http\Message\ServerRequestInterface;

# reactphp ServerRequestInterface 용 확장 클래스
class Requested
{
    public const __version = '1.1.0';
    private array $params   = [];

    public function __construct(
        private ServerRequestInterface $request
    ){
```

```
        $this->params = [];
    }

    public function post() : Requested
    {
        if ($this->request->getHeaderLine('Content-Type') == 'application/json') {
            $this->params = array_merge($this->params,json_decode($this->request->getBody()->getContents(),true) ?? []);
        }else {
            $this->params = array_merge($this->params,$this->request->getParsedBody());
        }
    return $this;
    }

    public function get() : Requested
    {
        $this->params = $this->request->getQueryParams();
    return $this;
    }

    public function __call($name, $arguments)
    {
        if (str_starts_with($name, 'with')) {
            $newRequest = $this->request->{$name}(...$arguments);
            $clone = clone $this;
            $clone->request = $newRequest;
            return $clone;
        }
        return call_user_func_array([$this->request, $name], $arguments);
    }

    public function fetch() : array{
        return $this->params;
    }

    public function __get($propertyName) : mixed
    {
        if(isset($this->params[$propertyName])){
            return $this->params[$propertyName];
        }
        return null;
    }

    public function __set($key, $value){
        $this->params[$key] = $value;
    }

    public function __isset($name) {
        return isset($this->params[$name]);
    }
}
```