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serhiy-storchaka authored on May 20, 2025 · 92 / 97 · Verified

```
[3.13] gh-133767: Fix use-after-free in the unicode-escape decoder with an error
handler (GH-129648) (GH-133944)

If the error handler is used, a new bytes object is created to set as
the object attribute of UnicodeDecodeError, and that bytes object then
replaces the original data. A pointer to the decoded data will became invalid
after destroying that temporary bytes object. So we need other way to return
the first invalid escape from _PyUnicode_DecodeUnicodeEscapeInternal().

_PyBytes_DecodeEscape() does not have such issue, because it does not
use the error handlers registry, but it should be changed for compatibility
with _PyUnicode_DecodeUnicodeEscapeInternal().
(cherry picked from commit 9f69a58)

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```

3.13 (AcreetionOS-Linux/python#2, #133944) · v3.13.13 ••• v3.13.4

1 parent 0c0fedf commit 6279eb8

8 files changed +194 -57

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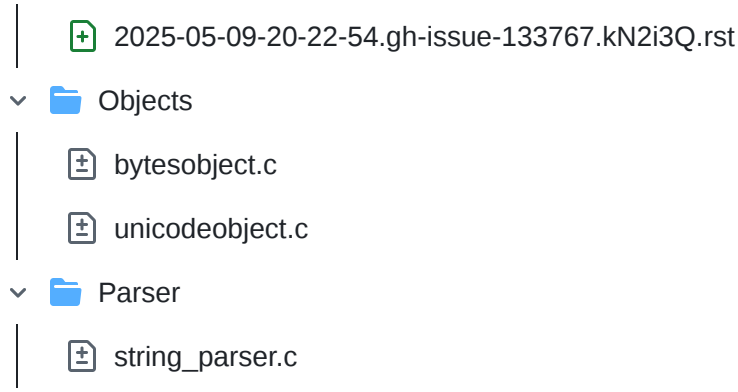

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Include/internal/pycore_bytesobject.h

```
@@ -20,6 +20,10 @@ extern PyObject* _PyBytes_FromHex(
20  20
21  21   // Helper for PyBytes_DecodeEscape that detects invalid escape chars.
22  22   // Export for test_peg_generator.
    23  + PyAPI_FUNC(PyObject*) _PyBytes_DecodeEscape2(const char *, Py_ssize_t,
    24  +                                              const char *,
    25  +                                              int *, const char **);
    26  + // Export for binary compatibility.
23  27   PyAPI_FUNC(PyObject*) _PyBytes_DecodeEscape(const char *, Py_ssize_t,
24  28                                               const char *, const char **);
25  29
```

Include/internal/pycore_unicodeobject.h

```
@@ -142,6 +142,19 @@ extern PyObject*
_PyUnicode_DecodeUnicodeEscapeStateful(
142 142  // Helper for PyUnicode_DecodeUnicodeEscape that detects invalid escape
143 143  // chars.
144 144  // Export for test_peg_generator.
    145 + PyAPI_FUNC(PyObject*) _PyUnicode_DecodeUnicodeEscapeInternal2(
    146 +     const char *string,     /* Unicode-Escape encoded string */
    147 +     Py_ssize_t length,      /* size of string */
    148 +     const char *errors,     /* error handling */
    149 +     Py_ssize_t *consumed,   /* bytes consumed */
    150 +     int *first_invalid_escape_char, /* on return, if not -1, contain the first
    151 +                                        invalid escaped char (<= 0xff) or
invalid
```

```
+                                       octal escape (> 0xff) in string. */
+    const char **first_invalid_escape_ptr); /* on return, if not NULL, may
+                                        point to the first invalid escaped
+                                        char in string.
+                                        May be NULL if errors is not NULL. */
+ // Export for binary compatibility.
 PyAPI_FUNC(PyObject*) _PyUnicode_DecodeUnicodeEscapeInternal(
     const char *string,     /* Unicode-Escape encoded string */
     Py_ssize_t length,      /* size of string */
```

Lib/test/test_codeccallbacks.py

```
@@ -1,6 +1,7 @@
 import codecs
 import html.entities
 import itertools
+import re
 import sys
 import unicodedata
 import unittest
@@ -1124,7 +1125,7 @@ def test_bug828737(self):
             text = 'abc<def>ghi'*n
             text.translate(charmap)

-    def test_mutatingdecodehandler(self):
+    def test_mutating_decode_handler(self):
         baddata = [
             ("ascii", b"\xff"),
             ("utf-7", b"++"),
@@ -1159,6 +1160,42 @@ def mutating(exc):
             for (encoding, data) in baddata:
                 self.assertEqual(data.decode(encoding, "test.mutating"),
                                  "\u4242")

+    def test_mutating_decode_handler_unicode_escape(self):
+        decode = codecs.unicode_escape_decode
+        def mutating(exc):
+            if isinstance(exc, UnicodeDecodeError):
```

```
1167 +                 r = data.get(exc.object[:exc.end])
1168 +                 if r is not None:
1169 +                     exc.object = r[0] + exc.object[exc.end:]
1170 +                     return ('\u0404', r[1])
1171 +             raise AssertionError("don't know how to handle %r" % exc)
1172 +
1173 +         codecs.register_error('test.mutating2', mutating)
1174 +         data = {
1175 +             br'\x0': (b'\\', 0),
1176 +             br'\x3': (b'xxx\\', 3),
1177 +             br'\x5': (b'x\\', 1),
1178 +         }
1179 +         def check(input, expected, msg):
1180 +             with self.assertWarns(DeprecationWarning) as cm:
1181 +                 self.assertEqual(decode(input, 'test.mutating2'), (expected,
     len(input)))
1182 +             self.assertIn(msg, str(cm.warning))
1183 +
1184 +         check(br'\x0n\z', '\u0404\n\\z', r"invalid escape sequence '\z'")
1185 +         check(br'\x0n\501', '\u0404\n\u0141', r"invalid octal escape sequence
     '\501'")
1186 +         check(br'\x0z', '\u0404\\z', r"invalid escape sequence '\z'")
1187 +
1188 +         check(br'\x3n\zr', '\u0404\n\\zr', r"invalid escape sequence '\z'")
1189 +         check(br'\x3zr', '\u0404\\zr', r"invalid escape sequence '\z'")
1190 +         check(br'\x3z5', '\u0404\\z5', r"invalid escape sequence '\z'")
1191 +         check(memoryview(br'\x3z5x')[:-1], '\u0404\\z5', r"invalid escape
     sequence '\z'")
1192 +         check(memoryview(br'\x3z5xy')[:-2], '\u0404\\z5', r"invalid escape
     sequence '\z'")
1193 +
1194 +         check(br'\x5n\z', '\u0404\n\\z', r"invalid escape sequence '\z'")
1195 +         check(br'\x5n\501', '\u0404\n\u0141', r"invalid octal escape sequence
     '\501'")
1196 +         check(br'\x5z', '\u0404\\z', r"invalid escape sequence '\z'")
1197 +         check(memoryview(br'\x5zy')[:-1], '\u0404\\z', r"invalid escape
     sequence '\z'")
1198 +
1162 1199         # issue32583
1163 1200         def test_crashing_decode_handler(self):
```

```
1164  1201            # better generating one more character to fill the extra space slot
```

Lib/test/test_codecs.py

```
      @@ -1196,23 +1196,39 @@ def test_escape(self):
1196  1196            check(br"[\1010]", b"[A0]")
1197  1197            check(br"[\x41]", b"[A]")
1198  1198            check(br"[\x410]", b"[A0]")
      1199  +
      1200  +     def test_warnings(self):
      1201  +         decode = codecs.escape_decode
      1202  +         check = coding_checker(self, decode)
1199  1203            for i in range(97, 123):
1200  1204                b = bytes([i])
1201  1205                if b not in b'abfnrtvx':
1202        -                   with self.assertWarns(DeprecationWarning):
      1206  +                   with self.assertWarnsRegex(DeprecationWarning,
      1207  +                           r"invalid escape sequence '\\%c'" % i):
1203  1208                        check(b"\\" + b, b"\\" + b)
1204        -               with self.assertWarns(DeprecationWarning):
      1209  +               with self.assertWarnsRegex(DeprecationWarning,
      1210  +                       r"invalid escape sequence '\\%c'" % (i-32)):
1205  1211                    check(b"\\" + b.upper(), b"\\" + b.upper())
1206        -           with self.assertWarns(DeprecationWarning):
      1212  +           with self.assertWarnsRegex(DeprecationWarning,
      1213  +                   r"invalid escape sequence '\\8'"):
1207  1214                check(br"\8", b"\\8")
1208  1215            with self.assertWarns(DeprecationWarning):
1209  1216                check(br"\9", b"\\9")
1210        -           with self.assertWarns(DeprecationWarning):
      1217  +           with self.assertWarnsRegex(DeprecationWarning,
      1218  +                   r"invalid escape sequence '\\\xfa'") as cm:
1211  1219                check(b"\\\xfa", b"\\\xfa")
1212  1220            for i in range(0o400, 0o1000):
1213        -               with self.assertWarns(DeprecationWarning):
      1221  +               with self.assertWarnsRegex(DeprecationWarning,
      1222  +                       r"invalid octal escape sequence '\\%o'" % i):
1214  1223                    check(rb'\%o' % i, bytes([i & 0o377]))
1215  1224
      1225  +         with self.assertWarnsRegex(DeprecationWarning,
```

```
         1226 +                 r"invalid escape sequence '\\z'"):
         1227 +             self.assertEqual(decode(br'\x\z', 'ignore'), (b'\\z', 4))
         1228 +         with self.assertWarnsRegex(DeprecationWarning,
         1229 +                 r"invalid octal escape sequence '\\501'"):
         1230 +             self.assertEqual(decode(br'\x\501', 'ignore'), (b'A', 6))
         1231 +
 1216    1232       def test_errors(self):
 1217    1233           decode = codecs.escape_decode
 1218    1234           self.assertRaises(ValueError, decode, br"\x")
                    @@ -2661,24 +2677,40 @@ def test_escape_decode(self):
 2661    2677           check(br"[\x410]", "[A0]")
 2662    2678           check(br"\u20ac", "\u20ac")
 2663    2679           check(br"\U0001d120", "\U0001d120")
         2680 +
         2681 +     def test_decode_warnings(self):
         2682 +         decode = codecs.unicode_escape_decode
         2683 +         check = coding_checker(self, decode)
 2664    2684           for i in range(97, 123):
 2665    2685               b = bytes([i])
 2666    2686               if b not in b'abfnrtuvx':
 2667         -                 with self.assertWarns(DeprecationWarning):
         2687 +                 with self.assertWarnsRegex(DeprecationWarning,
         2688 +                         r"invalid escape sequence '\\%c'" % i):
 2668    2689                       check(b"\\" + b, "\\" + chr(i))
 2669    2690               if b.upper() not in b'UN':
 2670         -                 with self.assertWarns(DeprecationWarning):
         2691 +                 with self.assertWarnsRegex(DeprecationWarning,
         2692 +                         r"invalid escape sequence '\\%c'" % (i-32)):
 2671    2693                       check(b"\\" + b.upper(), "\\" + chr(i-32))
 2672         -         with self.assertWarns(DeprecationWarning):
         2694 +         with self.assertWarnsRegex(DeprecationWarning,
         2695 +                 r"invalid escape sequence '\\8'"):
 2673    2696               check(br"\8", "\\8")
 2674    2697           with self.assertWarns(DeprecationWarning):
 2675    2698               check(br"\9", "\\9")
 2676         -         with self.assertWarns(DeprecationWarning):
         2699 +         with self.assertWarnsRegex(DeprecationWarning,
         2700 +                 r"invalid escape sequence '\\\xfa'") as cm:
 2677    2701               check(b"\\\xfa", "\\\xfa")
```

```
2678  2702            for i in range(0o400, 0o1000):
2679        -             with self.assertWarns(DeprecationWarning):
      2703  +             with self.assertWarnsRegex(DeprecationWarning,
      2704  +                     r"invalid octal escape sequence '\\%o'" % i):
2680  2705                  check(rb'\%o' % i, chr(i))
2681  2706
      2707  +         with self.assertWarnsRegex(DeprecationWarning,
      2708  +                 r"invalid escape sequence '\\z'"):
      2709  +             self.assertEqual(decode(br'\x\z', 'ignore'), ('\\z', 4))
      2710  +         with self.assertWarnsRegex(DeprecationWarning,
      2711  +                 r"invalid octal escape sequence '\\501'"):
      2712  +             self.assertEqual(decode(br'\x\501', 'ignore'), ('\u0141', 6))
      2713  +
2682  2714      def test_decode_errors(self):
2683  2715          decode = codecs.unicode_escape_decode
2684  2716          for c, d in (b'x', 2), (b'u', 4), (b'U', 4):
```

...5-05-09-20-22-54.gh-issue-133767.kN2i3Q.rst

```
      •••   @@ -0,0 +1,2 @@
      1   + Fix use-after-free in the "unicode-escape" decoder with a non-"strict" error
      2   + handler.
```

Objects/bytesobject.c

```
          @@ -1065,10 +1065,11 @@ _PyBytes_FormatEx(const char *format, Py_ssize_t
          format_len,
1065  1065    }
1066  1066
1067  1067    /* Unescape a backslash-escaped string. */
1068        - PyObject *_PyBytes_DecodeEscape(const char *s,
      1068  + PyObject *_PyBytes_DecodeEscape2(const char *s,
1069  1069                                    Py_ssize_t len,
1070  1070                                    const char *errors,
1071        -                                 const char **first_invalid_escape)
      1071  +                                 int *first_invalid_escape_char,
      1072  +                                 const char **first_invalid_escape_ptr)
1072  1073    {
1073  1074        int c;
1074  1075        char *p;
```

```
@@ -1082,7 +1083,8 @@ PyObject *_PyBytes_DecodeEscape(const char *s,
1082 1083             return NULL;
1083 1084         writer.overallocate = 1;
1084 1085
1085      -      *first_invalid_escape = NULL;
     1086 +      *first_invalid_escape_char = -1;
     1087 +      *first_invalid_escape_ptr = NULL;
1086 1088
1087 1089         end = s + len;
1088 1090         while (s < end) {
@@ -1120,9 +1122,10 @@ PyObject *_PyBytes_DecodeEscape(const char *s,
1120 1122                         c = (c<<3) + *s++ - '0';
1121 1123                 }
1122 1124                 if (c > 0377) {
1123      -                   if (*first_invalid_escape == NULL) {
1124      -                       *first_invalid_escape = s-3; /* Back up 3 chars, since we've
1125      -                                                       already incremented s. */
     1125 +                   if (*first_invalid_escape_char == -1) {
     1126 +                       *first_invalid_escape_char = c;
     1127 +                       /* Back up 3 chars, since we've already incremented s. */
     1128 +                       *first_invalid_escape_ptr = s - 3;
1126 1129                     }
1127 1130                 }
1128 1131                 *p++ = c;
@@ -1163,9 +1166,10 @@ PyObject *_PyBytes_DecodeEscape(const char *s,
1163 1166                 break;
1164 1167
1165 1168             default:
1166      -               if (*first_invalid_escape == NULL) {
1167      -                   *first_invalid_escape = s-1; /* Back up one char, since we've
1168      -                                                   already incremented s. */
     1169 +               if (*first_invalid_escape_char == -1) {
     1170 +                   *first_invalid_escape_char = (unsigned char)s[-1];
     1171 +                   /* Back up one char, since we've already incremented s. */
     1172 +                   *first_invalid_escape_ptr = s - 1;
1169 1173                 }
1170 1174                 *p++ = '\\';
```

```
1171  1175                s--;
      @@ -1179,23 +1183,37 @@ PyObject *_PyBytes_DecodeEscape(const char *s,
1179  1183        return NULL;
1180  1184    }
1181  1185
      1186  + // Export for binary compatibility.
      1187  + PyObject *_PyBytes_DecodeEscape(const char *s,
      1188  +                                 Py_ssize_t len,
      1189  +                                 const char *errors,
      1190  +                                 const char **first_invalid_escape)
      1191  + {
      1192  +     int first_invalid_escape_char;
      1193  +     return _PyBytes_DecodeEscape2(
      1194  +             s, len, errors,
      1195  +             &first_invalid_escape_char,
      1196  +             first_invalid_escape);
      1197  + }
      1198  +
1182  1199    PyObject *PyBytes_DecodeEscape(const char *s,
1183  1200                                   Py_ssize_t len,
1184  1201                                   const char *errors,
1185  1202                                   Py_ssize_t Py_UNUSED(unicode),
1186  1203                                   const char *Py_UNUSED(recode_encoding))
1187  1204    {
1188        -     const char* first_invalid_escape;
1189        -     PyObject *result = _PyBytes_DecodeEscape(s, len, errors,
1190        -                                              &first_invalid_escape);
      1205  +     int first_invalid_escape_char;
      1206  +     const char *first_invalid_escape_ptr;
      1207  +     PyObject *result = _PyBytes_DecodeEscape2(s, len, errors,
      1208  +                                               &first_invalid_escape_char,
      1209  +                                               &first_invalid_escape_ptr);
1191  1210        if (result == NULL)
1192  1211            return NULL;
1193        -     if (first_invalid_escape != NULL) {
1194        -         unsigned char c = *first_invalid_escape;
1195        -         if ('4' <= c && c <= '7') {
      1212  +     if (first_invalid_escape_char != -1) {
      1213  +         if (first_invalid_escape_char > 0xff) {
1196  1214                if (PyErr_WarnFormat(PyExc_DeprecationWarning, 1,
```

```
1197      -                                 "invalid octal escape sequence '\\%.3s'",
1198      -                                 first_invalid_escape) < 0)
          1215 +                           "invalid octal escape sequence '\\%o'",
          1216 +                           first_invalid_escape_char) < 0)
1199      1217              {
1200      1218                  Py_DECREF(result);
1201      1219                  return NULL;
          @@ -1204,7 +1222,7 @@ PyObject *PyBytes_DecodeEscape(const char *s,
1204      1222          else {
1205      1223              if (PyErr_WarnFormat(PyExc_DeprecationWarning, 1,
1206      1224                                   "invalid escape sequence '\\%c'",
1207      -                                    c) < 0)
          1225 +                           first_invalid_escape_char) < 0)
1208      1226              {
1209      1227                  Py_DECREF(result);
1210      1228                  return NULL;
```

Comments 0